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WILDLIFE REVIEW

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Chicago, Ill. No. 40 June, 1944

Bibliography: Catalogue of Siphonaptera

Jellison, Wm. L., and Newell E. Good. Index to the literature of Siphonaptera of North America, U. S. Public Health Service, National Institute of Health Bulletin 178 (Supt. of Documents, Washington, D. C. 25 cents a copy), iv+195 pp., 1942.

A synopsis of the genera of N. A. fleas is given in systematic order. The catalogue proper in alphabetic sequence includes synonymy, collation of the literature, host citations, and miscellaneous comment by the authors. There is a geographical index to type localities, an 18 page-bibliography, and an index to all of the scientific names of fleas in the report. A thorough and useful document.

Classification: Siphonaptera, Hoplopsyllus

Kohls, Glen M. Siphonaptera: Notes on synonymy of North American species of the genus Hoplopsyllus Baker, U. S. Public Health Reports (Supt. of Documents, Washington, D. C. 5 cents a copy), 54(45), Nov. 10, 1939, pp. 2019-2020.

These fleas infest the wild hares and rabbits of North America.

Classification: Squamata, Storeria

Trapido, Harold. The snakes of the genus Storeria, American Midland Naturalist (Notre Dame, Ind. $1.00 a copy), 31(1), Jan. 1944, pp. 1-84, 61 figs., 19 tables.

Key to 12 species and subspecies and synonymy, description, illustrations, and measurements, and discussion of variation, distribution, and affinities of each of them. Locality records are fully cited and ranges mapped. Bibliography of 45 titles. A thorough paper.

Conservation

Buchheister, Carl W. The comeback of the cormorants, Audubon Magazine (1006 Fifth Ave., New York, 28, N. Y. 35 cents a copy), 46(1), Jan.-Feb. 1944, pp. 15-25, 11 photos.

The history of cormorants on the New England coast is traced from original abundance through a decline brought about by persecution almost to the point of extirpation, and after awakening of public conscience through an increase under protection to numbers so great that for alleged economic reasons reduction is demanded. Scientific investigations to date have indicated that the cormorants do little harm to man's economy and have certain beneficial influences. The author pleads for full investigation before control is begun and for adequate supervision if it is adopted.

Conservation

Stevens, Ross O. Basic wildlife conservation, Journ. Elisha Mitchell Scientific Society (Chapel Hill, N. C. $1.50 a copy), 59(2), Dec. 1943, pp. 209-213.

History of research in wildlife management in the United States. "All of these early game projects had two important purposes. Their sponsors were hopeful of obtaining badly needed facts upon which to base better game management. Primarily, however, the purpose of these initial projects was to create an interest on the part of the state game departments to carry on wildlife research, and experimental work, and to improve game and fish administration." Availability of relief funds stimulated the work but many projects were abandoned. The reasons for failure were chiefly: inadequacy of personnel and lack of continuity of game and fish administrative programs. Even where relative stability in these organizations has been achieved, wildlife conservation has not advanced because of lack of public information and interest. Where interest is aroused, it tends to subside so that conservation effort oscillates from efficiency to inefficiency. Conservation department personnel "are working under a system which we the people make available for them. If the system will not permit development of a sound wildlife program, the solution lies with all the people and not with the individuals directly concerned."

Conservation: Beaver

Hatch, A. B. The wartime status of beaver in the western United States, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 302-307, 1 fig.

Although beaver restoration has had very satisfactory results, the presence of the animals in abundance has inspired attempts to get legislation that will permit their exploitation. The author points out the dangers involved and proposes a system of beaver administration and management to maintain the species as a permanent resource.

Conservation: Duck, Wood

Volkert, E. C. Why the wood duck needs protection, Outdoor America (114 S. Carroll St., Madison, Wis. 10 cents a copy), 9(1), Jan.-Feb. 1944, pp. 4-5, 16, 2 photos.

Incorporated with this plea for protection are both compiled and original data on life history.

Conservation: Falconry a menace

MAIN LIBRARY

Edge, Rosalie. The duck hawk and the falconers, Emergency Conservation Committee (767 Lexington Ave., New York, 21, N. Y.), Publication No. 90, 7 pp., 1 pl., 1 fig., April 1944 (10 cents a copy).

The rarity of the duck hawk--a status which falconry is not likely to improve--is emphasized. Tendencies of the sport detrimental to conservation and in conflict with humane procedures are reviewed. Legal recognition of falconry as a mode of hunting is opposed.

Control: Corn pulling

Loyster, E. L. Pheasant repellent, Wisconsin Conservation Bulletin (Wisconsin Conservation Dept., Madison), 9(4), April 1944, pp. 10-11.

Report on distribution of red-lead oxide for coating seed corn to 293 farmers. Replies were received from 118, 45 of whom reported excellent, and 38, good, results. Eighty-five found no replanting necessary. A total of 113 acres of planting was lost despite the use of the repellent, about 4.2 percent of the 2,688 acres treated.

Control: Ground squirrel, Richardson's

Brown, John H., and G. Douglas Roy. The Richardson ground squirrel, Citellus richardsonii Sabine, in southern Alberta: Its importance and control, Scientific Agric. (1005 Confederation Bldg., Ottawa, Canada), 24(4), 1943, pp. 176-197, 1 fig., 4 maps.

The Richardson ground squirrel was found to be widely distributed in southern Alberta. Populations varied from 2 per acre on irrigated land to 6 per acre on abandoned land, and 8 per acre on natural prairie. Cultivated land had 5 animals per acre. The species was found to have one litter a year with 6-8 (text) or 4-9 (summary) young. It is destructive to field crops and municipalities distribute free poison and formerly paid bounties. The latter system was most effective, but was discontinued when the occurrence of plague was established. Hawks are the most important natural enemies and complete protection is recommended for them. In addition to plague, which is suspected to have caused one human death, the Richardson ground squirrel is stated to be a reservoir for Rocky Mountain spotted fever, tularemia, and equine encephalomyelitis. These statements (and others) are either unsupported by pertinent data or supported only by reference to unpublished reports of the Alberta Rocky Mountain Spotted Fever and Sylvatic Plague Survey. The Richardson ground squirrel is host to six species of fleas and the spotted fever tick.

Control measures were effective on an experimental area of 72 square miles. Oats poisoned with strychnine or sodium arsenite are recommended. Cyanogas is suggested only for plague areas because it is expensive to use. A control campaign is advocated.--C. H. D. Clarke.

Control: Lotus

Siegler, Hilbert R. Lotus control, Journ. Wildlife Management (P. F. English, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 8(2), April 1944, p. 170.

By spraying the leaves with oil; directions are given. [The treatment probably must be repeated from year to year as the lotus, like other water-lilies, has a very resistant rootstock.]

Control: Mice, Field

Eadie, W. Robert. The field mouse cycle in New York, Farm Research (Cornell University Agricultural Experiment Station, Ithaca, N. Y.), 9(4), Oct. 1943, pp. 1, 15, 2 photos.

Popular discussion of factors that may affect fluctuations in field mouse populations, which in New York are chiefly on a 4-year, but sometimes on a 3-year, cycle. Control measures are discussed and summarized. For orchard protection they should include: "(1) Reduction of surface cover thruout the growing season; (2) distribution of rodenticides in the fall and possibly in winter months; and (3) use of tree guards and barren zones at the tree base, or both."

Control: Noxious plants

Wilson, H. K. Control of noxious plants, Botanical Review (Queen St. and McGovern Ave., Lancaster, Pa. 50 cents a copy), 10(5), May 1944, pp. 279-326.

Thorough review of the subject with respect to terrestrial weeds (those of the water not treated). Bibliography of 409 titles.

Control: Techniques

Horn, E. E. Requirements and techniques of rodent control, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 417-422.

Control by ecological means is desirable but can be used only where it is compatible with land use. The author is skeptical as to control of rodent populations by natural enemies. Results from inoculation with disease have been too uncertain to encourage much dependence upon this method. Various obstacles are met in artificial control in connection with administering precise lethal doses, in overcoming the animals' abilities in learning to avoid poisons, and in getting proper concentrations of lethal gases in burrows.

Cycles

Scott, W. E. Does inbreeding cause the cycle in game animals?, Wisconsin Conservation Bulletin (Wisconsin Conservation Dept., Madison), 9(2), Feb. 1944, pp. 6-10.

Quotations are given from 9 wildlife students especially qualified to pronounce upon the question proposed; all give a negative answer. The paper is worth reading for the comment it contains upon both inbreeding and cyclic fluctuations.

Cycles: Pheasant

Bach, Roy N. Population fluctuations of the North Dakota pheasant 1938-1943, North Dakota Outdoors (State Game and Fish Department, Bismarck, N. Dak.), 6(7), Jan. 1944, pp. 8-9, 1 table, 1 graph.

The data are presented by index figures (not actual numbers) gained from roadside counts. The author does not so indicate but to the abstracter the graph looks very much like a section of a curve of a cyclic species. The pheasant has not yet been definitely shown to have a population cycle, so continuation of the studies here reported will have unusual interest.

Destruction

Taylor, Walter P. Vanishing species of wildlife in Texas, Texas Game and Fish (Game, Fish, and Oyster Commission, Walton Bldg., Austin, Texas. 10 cents a copy), 2(5), April 1944, pp. 3, 7.

The black bear, bighorn, Attwater's and lesser prairie chickens, and the subtropical fauna of the Lower Rio Grande region, including the white-winged and white-fronted doves, red-billed pigeon, chachalaca, Derby flycatcher, and the eyra cat, are in danger of extirpation. Only extensive reservation of suitable habitat can save them.

Diseases and Parasites: Necrotic stomatitis

Anon. Disease kills feedground elk, Wyoming Wild Life (Wyoming Game and Fish Dept., Cheyenne), 9(2), Feb. 1944, pp. 1-8, 27, 4 photos.

Of 1,046 elk dying on the Jackson Hole Federal Elk Refuge during the winter of 1942-43, the majority perished from the ravages of necrotic stomatitis. In recent years this malady has caused the death, on the average, of a tenth of the animals wintering on the feedground. The causative agent, Actinomyces necrophorus, is the same as in common foot rot in sheep, gangrenous dermatitis in horses, and diphtheria in calves. It is known to affect also the reindeer, antelope, and buffalo. The symptoms, lesions, and course of the malady are described and methods of remedying the situation are considered.

Diseases and Parasites: Paratyphoid

Dalmat, Herbert T. Paratyphoid infection in the northern white-footed mouse in central Iowa, American Midland Naturalist (Notre Dame, Ind. $1.00 a copy), 31(1), Jan. 1944, pp. 179-181.

Of 240 mice live-trapped, Aug. 3 to Sept. 13, all succumbed. Investigation revealed infection by Salmonella typhimurium. Continued trapping demonstrated the infection to be prevalent among the animals in the wild. It was greatest in warm weather and disappeared completely after November 2. Synonymy and general information about this species of Salmonella are presented. Bibliography of 6 titles.

Diseases and Parasites: Plague

Brown, John H. Sylvatic plague: The recovery of fleas from the burrowing owl and its burrow in a plague area in Alberta, Entomological News (Academy of Natural Sciences, Philadelphia, Pa. 35 cents a copy), 55(1), Jan. 1944, pp. 15-18.

"The burrowing owl invariably removes its victim to its burrow before it starts to feed, and it is this habit that accounts for the large number of rodent fleas in the burrow, and also for the presence of such fleas on the bird." The author reviews previous records and reports his own findings; fleas including known plague-vectors occur in the burrows and on the owls.

Diseases and Parasites: Tularemia

Alexander, I. H. Tularemia, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg. 10 cents a copy), 15(2), May 1944, pp. 3, 28, 2 charts.

Mostly on the disease in humans; 16,447 cases, 1,191 fatal, occurred in the United States from 1924-1942, inclusive. In Pennsylvania, 1928-1943, there were 282 cases, 25 of which terminated in death. Means of infection, precautions against it, and recognition of the disease are discussed. The main recommendation is for the discontinuance of the stocking of imported rabbits.

Diseases and Parasites: Tularemia

Jellison, Wm. L., Glen M. Kohls, M. J. Butler, and James A. Weaver. Epizootic tularemia in the beaver, Castor canadensis, and the contamination of stream water with Pasteurella tularensis, Amer. Journ. Hygiene (615 N. Wolfe St., Baltimore, Md. $2.00 a copy), 36(2), Sept. 1942, pp. 168-182, 8 figs., 1 table.

Authors' summary: "Field and laboratory studies are reported of an epizootic in beavers that affected numerous Montana streams from the late fall of 1939 to the late spring of 1940. P. tularensis was recovered from the tissues of dead beavers from 7 of the 8 areas involved. The facts that in the region concerned beavers are not known to harbor ticks, fleas, or other blood-sucking arthropods and that most of the deaths occurred at the season of the year when blood-sucking diptera were inactive suggested the improbability of arthropod transmission. The only positive evidence of tularemia infection in land animals living in close proximity to streams was obtained from field mice (Microtus pennsylvanicus) which were abundant in some of the areas and had been so recently in others. The tissues of 6 dead mice, 4 of them from the immediate vicinities of points where dead beavers were found, proved to be infected.

"Apparent avenues of contact between tularemia-infected land animals and water animals are: (a) when stream water becomes contaminated with carcasses, tissue fragments, or infectious material from land animals (e.g., urine); and (b) when water animals leave the stream for food-getting and other

activities on land. Water from 4 streams, one in each of 4 of the affected areas, was shown to be contaminated with P. tularensis, and in one stream contamination persisted for at least 33 days after any beavers were known to be present. No other streams were tested. Definite conclusions are impossible as to the primary source of the infection in beavers or the avenue or avenues by which they may acquire infection. The data obtained suggest two new questions concerning the epidemiology of tularemia: (a) the possibility that under favorable conditions epizootics may occur in local animal populations without the aid of blood-sucking parasites, and (b) the possibility that P. tularensis-contaminated stream water may be an occasional source of human infection in this country." Bibliography of 8 titles.

Diseases and Parasites: Tularemia

Lincoln, Robert Page. Tularemia: The rabbit disease, Southern Sportsman (Steck Bldg., Austin, Texas. 15 cents a copy), 7(3), Dec. 1943, pp. 8, 23-24.

Popular summary of information as to progress in knowledge of the disease, its prevalence among human beings, mode of transmission, danger of infection from rabbits, symptoms, precautions that should be observed.

Diseases and Parasites: Acarina, Dermacentor

Brown, John H. The spotted fever and other Albertan ticks, Canadian Journal of Research (National Research Council, Ottawa, Canada), Sec. D, 22(2), April 1944, pp. 36-51, 1 pl., 2 maps, 3 tables.

The Rocky Mountain spotted fever tick (Dermacentor andersoni)is abundant in southern Alberta. Since 1938, in 412 collections, 58,534 drag ticks and 3,851 host ticks have been collected. Two collections carried spotted fever and 16 tularemia. Ticks were most abundant on western and southern slopes of well-vegetated coulees in dry range land. The suppression of prairie fires is suggested to have been responsible for an increase of ticks, together with the increase in available hosts resulting from the introduction of domestic animals. The spotted fever tick is described and illustrated and its life history, range, and ecology are discussed. Nine other species of ticks are reported from Alberta. Hosts are listed chiefly by group vernacular names. Bibliography of 30 titles.--C. H. D. Clarke.

Diseases and Parasites: Acarina, Dermacentor

Eddy, Gaines W., and C. R. Joyce. The seasonal history and hosts of the American dog tick, Dermacentor variabilis, in Iowa, Iowa State College Journ. Sci. (Collegiate Press, Ames, Iowa. $1.00 a copy), 18(3), April 1944, pp. 313-324, 3 tables.

Review of literature (26 titles cited) with special reference to the role of this tick in disease transmission. Notes on life history and upon wild hosts and the extent of their infestations.

Diseases and Parasites: Acarina, Ixodes

Cooley, R. A. Ixodes neotomae, a new species from California (Acarina: Ixodidae), Pan-Pacific Entomologist (R. C. Miller, California Academy of Sciences, San Francisco. 75 cents a copy), 20(1), Jan. 1944, pp. 7-12, 2 figs.

From woodrats and rabbits; description, illustrations, comparative notes.

Diseases and Parasites: Acarina, Ixodes

Cooley, R. A., and Glen M. Kohls. Ixodes californicus Banks 1904, Ixodes pacificus n. sp., and Ixodes conepati n. sp., Pan-Pacific Entomologist (R. C. Miller, California Academy of Sciences, San Francisco. 75 cents a copy), 19(4), Oct. 1943, pp. 139-147, 3 figs.

Discussion of the status of the first-named species and original descriptionsand illustration of the others which are from the black-tailed deer and the hog-nosed skunk, respectively.

Diseases and Parasites: Blood parasites

Thompson, Paul E., and Clay G. Huff. Saurian malarial parasites of the United States and Mexico, Journ. Infectious Diseases (University of Chicago Press, 5750 Ellis Ave., Chicago, Ill. $2.00 a copy), 74(1), Jan.-Feb. 1944, pp. 68-79, 1 fig., 4 tables.

One new species from the United States is described--Plasmodium floridense from the lizard Sceloporus undulatus. The presence of malarial parasites in Florida lizards is discussed as is also the natural incidence of blood parasites in North and Central American lizards. "Approximately 9.4% were infected with malarial parasites, 2.7% with unidentified sporozoa, and 1.1% with microfilariae." The supporting data are tabulated. Possible vectors are considered. The species of Plasmodium described from lizards of the world are listed together with their hosts and type localities. Thirty-eight references to literature are appended.

Diseases and Parasites: Nematoda, Thelazia

Herman, Carlton M. Eye worm (Thelazia californiensis) infection in deer in California, California Fish and Game (Ferry Bldg., San Francisco, Calif.), 30(1), Jan. 1944, pp. 58-59, Fig. 32.

Review of records of this parasite in deer and other animals, including man (all in California). Description, symptoms of their occurrence, possible means of transmission. Bibliography of 10 titles.

Diseases and Parasites: Siphonaptera, Malaraeus

Burroughs, A. L. The flea Malaraeus telchicum a vector of P. pestis, Proc. Soc. Expt. Biol. and Medicine (Utica, N. Y. $1.00 a copy), 55(1), Jan. 1944, pp. 10-11, 1 table.

Records of fleas collected in the San Francisco Bay region, California, from meadow mice, deer mice, harvest mice, and brown rats. The species named, the only one found to parasitize all of the spontaneous hosts of plague in this group of mammals, was definitely proved to be a vector of the disease.

Diseases and Parasites: Siphonaptera of pikas

Jellison, Wm. L. Siphonaptera: The genera Amphalius and Ctenophyllus in North America, U. S. Public Health Reports (Supt. of Documents, Washington, D. C. 5 cents a copy), 56(49), Dec. 1941, pp. 2341-2349, 2 figs.

Fleas of two genera, each with a single species, are described and illustrated. They occur only upon pikas; localities of collection are listed and mapped. A footnote records supplementary information including notice of the description of a flea of a third genus from the same hosts.

Diseases and Parasites: Siphonaptera of prairie dogs

Jellison, Wm. L. Notes on the fleas of prairie dogs, with the description of a new subspecies, U. S. Public Health Reports (Supt. of Documents, Washington, D. C. 5 cents a copy), 54(20), May 19, 1939, pp. 840-844, figs.

Descriptions, illustrations, host and locality records for two species of the genus Opisocrostis. A subspecies O. tuberculatus cynomuris from Montana, Colorado, and Wyoming is described as new.

Diseases and Parasites: Of hare, snowshoe

Erickson, Arnold B. Helminth infections in relation to population fluctuations in snowshoe hares, Journ. Wildlife Management (P. F. English, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 8(2), April 1944, pp. 134-153, 1 pl., 5 figs., 2 tables.

The author reviews the literature of helminth infections in snowshoe hares (78 titles; it should have been noted that Curtice's animals, if "from near Washington, D. C." must have been captives). Methods of the study are described and keys presented for the identification of the parasitic worms of hares in the orders: Trematoda, Cestoda, and Nematoda. The results of the author's studies are discussed and summarized, in part, as follows: "The gastro-intestinal tracts of 953 snowshoe hares, collected in Minnesota from September 1931 through December 30, 1940, were examined for helminth parasites. The animals were taken during all seasons and represented many of both sexes and all age classes. Particular attention was given to the effect of helminth parasitism on the fluctuation of hare populations. The following helminths were considered significant in causing mortality: stomach worm (Obeliscoides cuniculi), trichostrongylids (Trichostrongylus calcaratus, T. affinis, and Nematodirus triangularis), pin worm (Passalurus nonanulatus), and larvae of a tapeworm (Taenia pisiformis). Parasites were not abundant from 1931 to 1935, when hare populations were building up; but gradually they increased and by 1935-36 a peak of parasitism by six species of nematodes and two species of

cestodes was reached, when the hares began to die off. x x x The highest percentages of concurrent infections of parasites were found from 1936 to 1940 when hares were dying in the largest numbers. x x x Stomach worms, trichostrongylids, pin worms, and tapeworm larvae (T. pisiformis) apparently were important in reducing the resistance of hares to other decimating factors and in killing some animals outright by sucking blood (stomach worm and trichostrongylids), by utilizing food, by producing toxins (T. calcaratus and probably T. affinis, O. cuniculi, and Protostrongylus boughtoni), and by causing erosion of the gastric glands, inflammation and thickening of the pyloric valve, spindle-cell sarcoma (stomach worms), liver damage (T. pisiformis) and lung damage (P. boughtoni), thus directly or indirectly influencing the decline of hare populations in Minnesota from 1935 to 1939."

Ecology: Biomes

Brecher, Leonard C. The relation of vegetational life-forms to the distribution of breeding birds, The Kentucky Warbler (Harvey B. Lovell, 3011 Meade Ave., Louisville, Ky.), 19(3), Fall 1943, pp. 41-49, 2 maps.

Comparison of the life-zone and biome concepts with maps illustrating their application to North America. Discussion of the relation of bird distribution to biomes. Author's summary: "(1) The basic concept of the life-zone theory is invalid, and x x x while temperature is an important factor, the value of the life-zone concept now lies in the designation of certain geographic areas; (2) the more recent concept of the relationships between the flora and fauna of a biotic community accord with known biological facts and embrace the biome with its various developmental stages; (3) breeding birds generally show a fidelity to a particular life-form which is vegetational in character, though some species use a physical form, both of which are usually associated with a niche or habitat; (4) the extension or limitation of this life-form is a major factor in the complex which governs the distribution of breeding birds." Bibliography of 16 titles.

Ecology: Census methods

Dalke, Paul D. Recent developments in census techniques applied to upland game in Missouri, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 380-384.

Local conditions pertaining both to the bird and to the human population made feasible the basing of a wild turkey inventory upon estimates by farmers, hunters, country storekeepers, and game protective officers. An intensive recheck indicated an accuracy of 86 percent for the method in one area of 220 square miles. For the prairie chicken, sample counts of booming grounds and the average number of birds using them proved satisfactory. In the case of the bobwhite, the number of whistling cocks in July approximates that of the birds killed per gun-hour in the following hunting season. "Needless to say, these figures in themselves have no census value. An approach to a statewide census method is being sought through a combination of several sets of data: the whistling count; field measurement of the area covered at each stop;

field study of the proportion of mated and unmated cocks among the mid-summer whistlers; the fall sex ratio and the fall age ratio, being studied in Missouri by Starker Leopold. In addition, there is each year a late-winter census with dogs on 208 sample sections--the northwestern section of each nine surveyed townships--which provide a rough indication of the population at this season." Bibliography of 9 titles.

Ecology: Census methods

Kendeigh, S. Charles. Measurement of bird populations, Ecological Monographs (Duke University Press, Durham, N. C. $1.50 a copy), 14(1), Jan. 1944, pp. 67-106, 4 figs., 20 tables.

History of bird counting and discussion of the methods used. "Abundance of birds may be measured in relative terms or as actual populations. Although determination of relative abundance is sufficient for some purposes, it is more limited in its use and application than determination of actual populations, and the use and improvement of true census methods is encouraged." The author illustrates these types of counts by instances from his own experience in Ohio, Tennessee, and Illinois, and from the breeding bird censuses published in the Audubon Magazine. The bibliography exceeds 9 columns of entries. A very thorough article of considerable reference value.

Ecology: Census methods

Rasmussen, D. I., and Everett R. Doman. Census methods and their application in the management of mule deer, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 369-379, 1 table.

Authors' summary: "(1) A review is made of census methods that have been used in determining populations of white-tailed and mule deer and results of the application of some of these methods to mule deer in Utah; (2) individual censuses have little or no value in a management program unless used in relation to previous or subsequent censuses. Determination of trends is usually much more feasible and of nearly equal value in a management program; (3) the general reconnaissance method of enumerating mule deer has stressed determination of total numbers with the result that in many cases good field data have been buried and lost in the estimates; (4) airplane census has not proven successful with mule deer largely because of the rough type of country and evergreen cover characteristic of most mule deer ranges; (5) drives can determine numbers of mule deer on small areas but are impractical because of the man power needed. They are difficult in the rough mountainous terrain where mule deer are usually found; (6) strip censusing proved to be unsuitable in determining mule deer numbers; (7) meadow and feedground counts do not represent random samples and are therefore not reliable for sex and age ratios. They can serve to indicate population trends if made at comparable times and correlated with forage conditions; (8) the use of winter 'spot counts' on sample areas to determine trends appears to be the most practical direct method of making population studies of mule deer on western ranges; (9) tagging theoretically can supply definite data on total populations if a random sample is

obtained. Total populations from returns from tagged mature bucks were in close agreement with field observations. Returns from fawns tagged on feed grounds did not indicate numbers that were in agreement with other studies; (10) accurate random sex and age ratios and removal records can supply data for determining populations. The development of new methods utilizing this principle offers one of the most promising fields in census work; (11) an average 'kill ratio' for a deer herd, if known, can be utilized as a census method. On the Wasatch Game Preserve an 8-year study showed this ratio to be 1 to 0.193 when one-third of removal was females and two-thirds males; (12) tracks are valuable in determining mule deer distribution but their use appears impractical as a census method where large populations are involved except in migration counts; (13) pellet group counts can be used as an index to mule deer numbers and also a method for determining population trends; (14) in the final analysis forage utilization must form the basis for mule deer management. Recent range investigations have shown methods of determining forage production and utilization by weight, and further studies have shown that the weight of forage taken by deer is a relatively constant factor. Use of these factors can supply information on numbers; (15) since methods of counting mule deer by enumeration have not proved successful in determining total numbers, the value of this type of count appears to be limited to determining trends. Total populations can be determined more accurately by use of ratios and indices. Bibliography of 30 titles.

Ecology: Census methods

Siegler, Hilbert R., and Coleman C. Newman. The value and practicability of wildlife censuses along highways, Journ. Wildlife Management (P. F. English, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 8(2), April 1944, pp. 93-99, 1 fig., 1 table.

Critical review of the literature (34 titles cited; Simmons, James R., Feathers and Fur on the Turnpike, 1938 omitted, however) in the light of experience by the authors, who conclude: "(1) Counts of mourning doves during only two years will not reveal relative population densities from one season of the year to the next; (2) such counts provide general impressions as to the relative abundance of doves between two major plant zones; (3) highway mortality counts do not indicate the relative abundance, relative vulnerability to traffic, or relative mobility of one species as compared with another; (4) such mortality counts are of little value in life history studies, but carcasses of animals dead on roads afford some kinds of information; (5) highway mortality counts are of minor value for study of the distribution of species and lateral movement, population densities, and animal behavior; (6) because of the many variables encountered, it is generally difficult or impossible to ascertain reasons for the rise and fall of mortality of species on highways; or to discover practical remedies for decreasing such mortality; (7) such counts are of definite value in isolated instances of large local mortality, where the cause is readily apparent and remediable; (8) such counts, over a period of years are helpful in tracing extensions of range by some species."

Ecology: Census methods, mink

Sealander, John A. A criticism of Marshall's method for censusing mink, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor, $1.00 a copy), 25(1), Feb. 1944, pp. 84-86, 2 figs.

The method cited was based on measurement of the tracks of the hind feet and involved the assumption that those of the sexes are clearly separable. The present author finds considerable overlapping and concludes that if Marshall's method is followed, a great deal of caution must be used in interpreting the data.

Ecology: Flooding

Yeager, Lee E., and Harry G. Anderson. Some effects of flooding and waterfowl concentrations on mammals of a refuge area in central Illinois, American Midland Naturalist (Notre Dame, Ind. $1.00 a copy), 31(1), Jan. 1944, pp. 159-178, 2 figs., 5 tables.

The full protection afforded by the refuge resulted in a large mammal population, the density, denning habits, and behavior of which are discussed by species. Food habits, especially as affected by the availability of dead and crippled waterfowl, are treated, those of the raccoon in most detail. Authors' summary: "(1) The Lake Chautauqua National Wildlife Refuge is a bottomland area of about 5,000 acres in Mason County, Illinois. It was established in 1936 and is now one of the most important duck concentration areas on the Mississippi flyway; (2) about 85 per cent, or 4,250 acres, of the total area is water, the level of which is maintained by dikes. The levee is of three main soil-cover types: loose sand, with weed and small willow cover; sandy clay, with weed, vine, and sapling-small tree cover; and sandy clay, with weed, vine and heavy tree cover. Only the latter type was bordered by a mature forest stand. The sand levee is only about three years old, while most of the other is 10 to 20 years old. This embankment affords the best site for ground dens anywhere on the north, south, and west sides of the refuge; (3) studies on levee ecology, and the effects of flooding and waterfowl concentration on mammals, are reported. Flooding occurred both in the fall and winter, further concentrating certain mammal populations. Legal hunting near the refuge made available to carnivorous species an abundance of unretrieved and crippled ducks; (4) the effect of flooding on mammals ranged from heavy mortality in the case of the woodchucks to apparently little basic change in the behavior of minks. During the October flood much new den construction, mainly by flooded-out woodchucks, was evident. Seventeen dead woodchucks, presumably dying from exposure, were found. Competition for ground dens was severe. In the absence of tree cavities, raccoons and opossums freely used ground retreats. Seventy-nine of the total of 114 ground dens were obviously in active use; others probably contained hibernating or inactive animals, or may have been flooded. Dens were seven times more abundant on the sapling bordered levee, and 17 times more abundant on the mature forest-bordered levee, than on the newly constructed levee of loose sand. Seventy-two per cent of the raccoon dens and 53 per cent of the opossum dens were in the forest-bordered levee; (5) hundreds of dead and crippled ducks were available to refuge carnivores.

There were several times more ducks on the two sections of the refuge near legal hunting grounds than on sections away from them, but dead and crippled birds were widely scattered over the entire refuge. Mallards and lesser scaups were represented in largest numbers; (6) carnivores took immediate advantage of the sudden availability of a new food supply. In 140 post-hunting season scats of raccoons, feathers, mainly of ducks, occurred in 55.7 per cent, and made up 51.7 per cent of the bulk. In 26 mink scats of post-hunting origin, duck feathers were present in 23, and constituted the entire content of 18. Despite the abundance of ducks, wild fruits and field corn composed nearly 40 per cent of the late fall and winter foods of raccoons. Dead and crippled ducks taken by carnivores would otherwise have served no useful purpose."

Ecology: Fox, Red

Cook, David B., and W. J. Hamilton, Jr. The ecological relationships of red fox food in eastern New York, Ecology (Prince and Lemon Sts., Lancaster, Pa. $1.50 a copy), 25(1), Jan. 1944, pp. 91-104, 5 figs., 1 table.

The region of the study, its natural vegetation, crops, and land use are succinctly described. Methods of food habits study are discussed, especially the use of scats as in the authors' investigations. Food habits as learned from analyses of 537 scats are tabulated and the principal food items considered in some detail. Mammals had an index of occurrence of 68 percent, fruits 73, insects 18, and birds 7 percent. The concept of predation in proportion to availability is supported. Authors' summary: "A six-year study of the food of the red fox in eastern New York, based on scat analysis, indicates the principal items to be cottontails, apples, meadow mice, wild fruits and insects. There is a marked seasonal variation. In winter the diet is chiefly mammals. From the time of the first strawberries until the fallen apples are covered with snow, fruit is more important than flesh. Insects are taken to a limited extent in summer and fall. Birds are of little importance at any season. The bulk of fox food is produced by brush lots, fencerows and grassland. The products of the forest are of minor importance." Bibliography of 11 titles.

Ecology: Homing of birds

Griffin, Donald R. The sensory basis of bird navigation, Quarterly Review of Biology (Williams and Wilkins Co., Baltimore, Md. $1.50 a copy), 19(1), March 1944, pp. 15-31, 2 figs., 2 tables.

The paper relates more to homing than to the broader subject of bird migration in general. The explanations of the homing faculty that have been proposed by other authors and three additional suggestions by the writer are discussed. From the author's summary: "It is concluded that many, but not all, of the homing experiments on record could be explained by assuming that when released in unfamiliar territory the birds scatter at random and explore until they find familiar landmarks. x x x The combined use of familiar landmarks, together with simple geographical, meteorological, and ecological relationships x x x seems more reasonable as an explanation of migration and homing than the postulation of a new sense organ." Extensive bibliography.

Ecology: In land management

Graham, Edward H. Natural principles of land use. 274 pp., 32 pls., 8 figs., 6 tables (Oxford University Press, 114 Fifth Ave., New York, 11, N. Y. $3.50 a copy), 1944.

The need for an ecological concept of land management is emphasized in specious headlines of the day: "A farm for every veteran"; "The dust-bowl is no more"; etc. Graham points out, for instance, that we have no more land frontiers and that drought is sure to return to the plains. The wise land manager is guided by indicator floras and heeds nature's cycles. Of most interest in this book to readers of this review is the role of the land-management biologist. It is the particular responsibility of this new technician "to look to the relation between the management of rural land, whether it be cropland, pasture, range, woodland, or wildlife land, and the complex of plants and animals which attends such management. The research directed by this biologist, or applied ecologist, if you choose to call him that, and the results he applies are related directly to methods of land management, and in this he differs from other biologists. His task is (1) to increase populations of species that are esteemed for their economic, recreational, aesthetic, or other values, (2) to decrease populations of those species that are harmful to useful plants and animals or otherwise injurious, and (3) to maintain a reasonable balance between communities of living things and land-use practices." These are not impossible tasks and they must be done. "I venture to state three basic implements with which the land-management biologist must be equipped to contribute satisfactorily to their completion. They are (1) a broad knowledge of ecological principles; (2) an intimate acquaintance with the common plants and animals; and (3) a practical understanding of land-management methods." Consideration of wildlife as it intermeshes with other things is a predominant element of the book, which discusses the relationship of living things and the land, the principle of ceaseless change, and the role of territory, food chains, predation and cycles in the animal world. Wildlife has its fair place also in the chapters on the study of living things and of the land and in those on farms, forest, and range. It has an account all of its own (Chapter 10, pp. 161-177) in which the ecological approach to its management is emphasized and the extent to which land can be allotted for wildlife purposes is considered. Recognition of a land class known as wildlife land is recommended.

Water products are not neglected. The history and handling of exotic species is discussed. Control is treated in a synoptic way, both as to objectives and methods. The welfare of the land and of the people are very closely connected and "one of the most significant contributions of the land-management biologist is the prediction of consequences resulting from a knowledge of natural principles." "Without a broad outlook and an attempt to relate knowledge to human welfare, the applied biologist x x x cannot be fully successful." "Knowledge for the land manager must be related to the tasks at hand. Much ecological research has been done, but at every turn the land technician meets biological questions for which the answers are nowhere to be found. For research bearing upon problems of land management, there must always be support, as we support research for the making of industrial products, or methods of controlling insects injurious to crops. Management problems are complex prob-

lems, challenging the ingenuity of the researcher, and for their solution there is real need."

"Land-management biology, as we have treated the subject in this book, has a part to play in conservation. And conservation is more than wise use and preservation of natural resources--mineral, soil and water, plant and animal, human. It may well be the foundation of a new social philosophy. Our public land policies, anti-trust regulations, tariffs, and related laws were developed around the exploitation of natural resources and they helped materially to promote our present economy. Is it not reasonable to suppose, then, that laws and regulations which promote the conservation of resources will help to build a new attitude toward the environment in which we live? And from this may well develop a way of life as different from the prevailing one as that is different from cultures of the past."

There is a briefly annotated bibliography of 29 pages; a roster of scientific names; and a general index. This prosaic abstract gives but a poor idea of the variety and interest of content of Graham's book. The volume is one which, if read carefully and reflectively, will bring the certain reward of improvement in concepts and methods to every wildlife manager or student aspirant.

Ecology: Kangaroo rat, Giant

Hawbecker, Albert C. The giant kangaroo rat and sheep forage, Journ. Wildlife Management (F. F. English, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 8(2), April 1944, pp. 161-165, 1 pl.

The habitat and habits of this species (Dipodomys ingens) are discussed, particularly in relation to the San Joaquin antelope squirrel (Citellus nelsoni). Food competition (small) and common enemies are briefly treated. The kangaroo rat has the interesting habits of clearing an area about the den and of curing food in stacks before caching it. Its activities have cultivating effect and certain forage plants grow better in areas it works over than elsewhere. In the locality studied, "The giant kangaroo rat and San Joaquin antelope squirrel occupy the same territory but do not compete; the former is abroad at night and the latter during the daytime. The cultivating action of the kangaroo rat increases the amount of red-stemmed filaree and red brome grass more than five times thus creating more sheep feed where greatly needed. The portions of land thus cultivated remain green longer in the season.

Ecology: Overpopulations

Randle, Allan C. Relationship of predatory control and big-game problem areas, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 329-331.

Overpopulations have developed where there has been no predator control. In fact, where the environment is suitable, steady increase seems to be the recent rule, regardless of potentially unfavorable factors.

Ecology: Populations, pheasant

Bach, Roy N. Important data relating to pheasant management in North Dakota, North Dakota Outdoors (Game and Fish Dept., Bismarck. 5 cents a copy), 6(10), April 1944, pp. 12-15.

The words, "in North Dakota," could well have been omitted from the title of this searching and intelligent analysis of population factors, knowledge of which is essential to rational management. The article is too compact for efficient abstracting, so its contents are here indicated only by a list of the topics treated: "(1) Total maximum population index on range; (2) total minimum population index on range; (3) existing sex ratio of minimum annual population; (4) old-young ratio at time of maximum annual population; (5) average nesting success index; (6) numerical mid-point of hunting season; (7) numerical mid-point of hatching season; (8) desired sex ratio of annual minimum population; (9) average potential life expectancy of any brood; (10) average annual population increase potential; (11) probable maximum population index."

Ecology: Populations, small mammal

Quimby, Don C. A comparison of overwintering populations of small mammals in a northern coniferous forest for two consecutive years, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 25(1), Feb. 1944, pp. 86-87, 1 table.

The trapping area is described and the results tabulated and discussed. In 1941, a total of 234 small mammals was taken in 7,254 trap-nights, while in 1942 only 75 were caught in 3,946 trap-nights. Reduced abundance affected all but one of the 8 species involved. Lessened snow cover may have been in part responsible for the drop in populations of the more upland species.

Ecology: Rabbits

Taylor, Walter P., and Daniel W. Lay. Ecologic niches occupied by rabbits in eastern Texas, Ecology (Prince and Lemon Sts., Lancaster, Pa. $1.50 a copy), 25(1), Jan. 1944, pp. 120-121.

Complete article: "Field work in eastern Texas centering in Walker County (from 1936 to the present) has disclosed some possibly significant relationships of the rabbits of that part of the State. These are the Oklahoma cottontail (Sylvilagus floridanus alacer), the Merriam jack rabbit (Lepus californicus merriami), and the Alabama swamp rabbit (Sylvilagus aquaticus aquaticus). The jack rabbit occurs mostly in the blackland prairie type on Wilson or Houston soils. When the pine timber (on Lufkin, Kirvin, Norfolk Sand, Segno, or similar soils) is clear cut, a few jack rabbits move to the cleared lands, especially if there has been some burning of slash to further open up the habitat. The jack rabbits remain only as long as the ground is open. Within three or four years the burns become scrubby with oak sprouts and miscellaneous shrubs, and the jack rabbits disappear. The cottontail is found in all the early stages of second growth but is most abundant from about 5 to 12 years after the timber is cut. This period coincides roughly with the

period of greatest variety and abundance of herbaceous plants. As the sapling pines and brushy hardwoods crowd out the herbaceous species foreshadowing the approach of the subclimax pine woods, the cottontails give way to swamp rabbits. The latter are usually more common than any other species in second growth timber over 12 years old, although the cottontail holds on persistently in spots where the forest growth is (rather) open enough to permit the growth of Andropogons.

"Grazing has an appreciable influence on the occurrence and distribution of these rabbits. Where grazing is light or absent cottontails are more numerous than at any other place. Thus on the 1,100 acres of ungrazed old fields (drive-type quail census in November 1936), 53 cottontails were seen, a small portion of number present, A similar count of 1,300 acres in February 1937 disclosed 79 rabbits. The next highest cottontail concentration was found in a game preserve which was only moderately grazed. Swamp rabbits were most numerous on relatively lightly grazed land, and, of course, they were the prevailing type in hardwood bottoms. Up to a certain point the jack rabbit benefits from grazing, tending to be scarce or absent when thick herbage, whether grass or other species, covers the ground and cuts down the visibility. Thus as overgrazing removes the vegetation the jack rabbit tends to increase, the cottontail to decrease."

Ecology: Seed dissemination

Paton, Robert R., Edmund Secrest, and Harold A. Ezri. Ohio forest plantings, Ohio Agricultural Expt. Sta. (Wooster), Bul. 647, 77 pp., 27 figs., 32 tables, Jan. 1944.

The general discussions of the needs, sites, and methods (including choice of species) for forest planting are of interest to wildlife managers in comparable areas. Of more general appeal is the discussion of volunteer forest growth especially as affected by birds, rodents, and other animals. Tables enumerate these and other agents concerned in the dissemination of forest tree seeds in four regions of Ohio. Animals were concerned in the seed dispersal of 43.2 percent of the volunteers in experimental seed plots. "The species distributed by birds are, for the most part, the less valuable trees, including black cherry, dogwood, black locust, honeylocust, redcedar, blackgum, and a number of other species commonly classed as weed trees. x x x Rodents distribute fewer species, but a larger percentage of them are commercially valuable. These include all the oaks, walnut, butternut, hickories, and beech. Other animals as disseminating agencies are relatively unimportant, and the species they disseminate are not valuable commercially. x x x In eastern Ohio, on the basis of frequency of plots affected, birds appeared to rank first as an agency of seed distribution, followed by wind as a secondary agency. In the western part of the State, the order was reversed, with wind in first place. Rodents appeared in third place in all regions."

Education: Arbor and Bird Day

Authors. Arbor Day and Bird Day, University of the State of New York (Albany), Bulletin to the Schools, 30(7), March 1944, pp. 221-268, illus.

Contains 19 contributions for use in observing the "days" indicated. Some of the titles illustrating the nature of the contents are: "Trees and birds," by Raymond T. Fuller (pp. 222-224); "The prairie horned lark in Dutchess County," Allen Frost (pp. 238-239); "Facts about flickers," Dayton Stoner (pp. 246-251); and "The passenger pigeon," R. E. Bowers (pp. 267-268).

Education: Wildlife conservation

Davis, William B. A wildlife conservation teaching program, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 198-205.

Outline and description of the course for training wildlife specialists at Texas Agricultural and Mechanical College, with illustrative comment on field studies and lists of papers for assigned reading.

Education: Wildlife management

Wing, Leonard. Class field trips in wildlife management, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 195-197.

Classes participate in censuses and game surveys and make cover maps and management plans for specific areas. Field trips varying from a few hours to 4 days in length are made to localities suitable for study of game species and of range use and management. State College of Washington.

Education: Wildlife techniques

Kelker, George Hills. Teaching outdoor wildlife techniques, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 206-209.

At the School of Forestry summer camp of Utah State Agricultural College. The lecture method is virtually unused; emphasis is upon student participation. Detailed instructions are given by mimeographed sheets and conferences are held as needed. Brief descriptions are given of the studies pursued and the methods used.

Food Habits: Birds vs. insects

Hodson, A. C. Birds feeding on forest insects, Flicker (Arnold B. Erickson, University of Minnesota, Minneapolis), 15(4), Dec. 1943, pp. 50-51.

Crows destroying about 20 percent of the cocoons of the forest tent caterpillar; "birds" 90 percent or more of above-ground cocoons of an introduced pine sawfly; and ruffed grouse gorging themselves upon walkingsticks.

Food Habits: Damage by red squirrel

Stillinger, C. R. Damage to conifers in northern Idaho by the Richardson red squirrel, Journ. Forestry (Mills Bldg., Washington, D. C. 50 cents a copy), 42(2), Feb. 1944, pp. 143-145.

Tamiasciurus hudsonicus richardsoni. Barking and girdling larches, firs, and pines, apparently to get the sap. The damage may prove serious locally: on an 0.8-acre plot with 35 scattered trees, 73 percent of the lodgepole pines and 21 percent of the larches were completely girdled, and 13 and 26 percent, respectively, had been partially girdled. The squirrels were observed to feed also on grasshoppers and fungi; records from the literature also are cited.

Food Habits: Damage by snowshoe hare

Aldous, Clarence M., and Shaler E. Aldous. The snowshoe hare--a serious enemy of forest plantations, Journ. Forestry (Mills Bldg., Washington, D. C. 50 cents a copy), 42(2), Feb. 1944, pp. 88-94, 3 photos, tables.

Review of information on cycles and densities of hare populations and report on investigations of damage and its control in Minnesota. Authors' conclusions: "(1) Though snowshoe hares have always fed more or less on coniferous seedlings, the effects were not forcibly brought to the attention of foresters until attempts were made to reforest unproductive areas by large-scale planting; (2) hares nip off the terminal and lateral buds and stems, thus tending to deform the trees as well as to retard their growth. This injury becomes apparent with each cyclic increase and is little noticed during the periods of relatively low population; (3) the success of many plantings depends on the protection afforded the seedlings during the time of high population peaks which occur approximately in 10-year cycles; (4) while no highly effective methods can be recommended for protecting the young seedlings from damage, the following measures will be helpful: a. During periods of high hare population, plantings should be confined to open sites of several acres or more; b. areas in low brush cover and those adjacent to swamps should be planted only during the lower part of the hare cycle, using large thrifty stock, followed by release cuttings where necessary; c. repellent sprays applied to the seedlings in the nursery prior to planting in the field will delay hare damage. Field application of sprays on a limited scale may help bring the trees through a critical period; d. hunting and snaring on limited areas is effective in reducing damage; e. poisoning can be used successfully in a selective manner where prejudice does not prevent its use; f. supplemental feeding by felling aspen in coniferous plantations during years of peak population will tend to attract the animals from the planted seedlings." Bibliography of 7 titles.

Food Habits: Damage by wild fowl

Anon. Survey damage to California rice crop by migratory wild fowl, Rice Journal (639 Carondelet St., New Orleans, La.), 46(10), Oct. 1943, pp. 16-18, tables.

Estimates of damage based on a questionary to which there was a 28 percent return. The estimates, tabulated by counties, are in excess of $600,000 for both of the years 1941 and 1942 and do not include the cost of bird-minding. Not only migratory waterfowl are involved in complaints but also blackbirds and pheasants. Some of the charges, as usual in such cases, are baseless, for instance, that of inroads upon rice by snipe. The investigating committee concludes: "This loss of food is inexcusable at any time, particularly during an all-out war when food is a vital factor in its successful prosecution. Appropriate steps should be taken at once by government agencies to reduce to a minimum all crop losses caused by wild fowl or any other protected fowl or birds." The recommendations of the Joint Wildlife Management Committee are presented in a later issue of the same publication (47(4), April 1944, pp. 15-16). They relate to feeding by duck clubs, increase in refuge facilities, ammunition supply, public shooting grounds, use of airplanes in herding ducks off crop lands, blackbird control, and permission for unrestricted shooting in areas where crop depredations are serious.

Food Habits: Wildlife in relation to Ribes

Offord, H. R., Clarence R. Quick, and Virgil D. Moss. Self-incompatibility in several species of Ribes in the western states, Journ. Agr. Research (Supt. of Documents, Washington, D. C. 15 cents a copy), 68(2), Jan. 15, 1944, pp. 65-71, 2 tables.

"Self-incompatability of Ribes will prevent heavy fruiting in scattered light populations of these plants. Also, rodent pressure is of increased significance when fruits are scarce. Together, these factors should simplify the control of blister rust disease in the white pine areas of the Far West."

"The annual output of Ribes seeds depends on the weather at the time of flowering, the activity of insect pollinators, and the consumption of fruit and seeds by rodents. Ribes fruits are highly favored by mice, chipmunks, and ground squirrels, which eat and destroy the seeds. One caged chipmunk, overnight, ate and destroyed about 6,000 seeds of R. viscosissimum Pursh. Birds scatter Ribes seeds but apparently do not necessarily destroy their viability. C. R. Quick collected droppings from robins and chickadees and subsequently obtained 60 to 90 percent germination of recovered seeds of R. cereum Dougl. and R. nevadense Kell." Bibliography of 9 titles.

Food Habits: Of big game, Alaska

Palmer, L. J. Food requirements of some Alaskan game mammals, Journ. Mammalogy (Ernest T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 25(1), Feb. 1944, pp. 49-54, 2 tables.

Based on feeding tests (the results of which are summarized in tables), estimates are made as to the forage requirements of the leading Alaskan ruminants. The utilization of lichens is especially discussed. Index figures are presented for game population densities in Alaska. The principal forage plants eaten by the caribou, Sitka deer, moose, musk ox, Dall's sheep, and buffalo are listed. Bibliography of 6 titles.

Food Habits: Of bobwhite

Cady, Earl L. Winter quail foods on abandoned farm lands in the Norris Reservoir area, Journ. Tennessee Acad. Sci. (Kendall Born, Tennessee Division of Geology, Nashville. 50 cents a copy), 19(1), Jan. 1944, pp. 10-15, 4 tables.

A study of the contents of 552 crops collected during 3 hunting seasons, the results of which are presented according to the weights of the food items, their percentage by weight, and their frequency of occurrence. Annual lespedezas and ragweed were the outstanding food producers; all identified items are listed. The annual lespedezas were introduced into eastern Tennessee only about 20 years ago. The two plants mentioned maintained their lead as quail foods even on abandoned farms.

Food Habits: Of fox, red

Heit, William S. Food habits of red foxes of the Maryland marshes, Journ. Mammalogy (Ermet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 25(1), Feb. 1944, pp. 55-58, 2 tables.

Report upon analyses of 95 scats collected on or near the Blackwater National Wildlife Refuge. The results are presented according to frequency of occurrence in monthly and seasonal summaries. The leading food items were meadow mice, muskrats, rabbits, and birds (of all kinds combined). Foxes appear a menace to the muskrat population but further studies should be made before aggressive control of the animals is decided upon.

Food Habits: Of mallard

Stoudt, Jerome H. Food preferences of mallards on the Chippewa National Forest, Minnesota, Journ. Wildlife Management (P. F. English, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 8(2), April 1944, pp. 100-112, 1 fig., 3 tables.

A local study of mallard food selection with "availability" considerably affected by hunting pressure. The study areas and field procedure are described. Results of stomach analyses are tabulated for a period preceding the hunting season (36 birds represented) and for the open season itself (306). The findings are discussed and conclusions drawn, among which are: "This study seems to bear out the viewpoint expressed earlier that wild rice is the food of greatest preference for mallards on the Chippewa National Forest area. When feeding on rice is discouraged by commercial ricing or by hunting pressure, other foods may be eaten readily but rice, when available, is the main choice in the autumn. Another emphatic conclusion relates to hunting pressure and its effect on duck food preferences. Such pressure is always heaviest on the better feeding areas because the ducks concentrate on those areas for some time previous to the opening day. The pressure is heaviest where the best food is most available, hence ducks on those areas are subjected to the most disturbance. As a consequence, after the first day or two, the volume of use of any duck food in a particular region is inversely proportional to the hunting

pressure on the water areas where that food is available, rather than being proportional to the abundance of the food itself. Actually the food is not available to the birds if hunting pressure is great enough to 'burn' the birds out of the area. Therefore an analysis of duck foods taken from ducks during the hunting season merely reflects the availability of these foods as determined by hunting pressure and not necessarily by the preferences of the ducks themselves. Consequently, wild rice has not shown up well in volume of use or in food preference rating in many duck food studies. Wild rice beds are very easily 'burned out' by hunters especially if hunting occurs too early or too late in the day. The ducks then may shun the rice beds entirely and resort to feeding on the areas of open water or in pot holes where pondweeds, bur-reeds, sedges and grasses are the only foods available."

Food Habits: Of meadowlark, western

Knowlton, G. F., and D. R. Haddock. Insect food of the western meadowlark, Great Basin Naturalist (Brigham Young University, Provo, Utah. 50 cents a copy), 4(3-4), Dec. 1943, pp. 101-102.

List and tabulation of insect food of 172 individuals collected in Utah. The insects most numerously eaten were beetles, caterpillars, and grasshoppers.

Food Habits: Of owls

Hope, C. E. Studying owl pellets, Canadian Nature (177 Jarvis St., Toronto, Canada. 25 cents a copy), 6(1), Jan.-Feb. 1944, pp. 22-23, illus.

Brief comment on owl pellets, their variations, and identification. Notes on contents of 2,700 of the short-eared owl collected near Toronto, in which "the remains of 4,105 animals were identified. Of this total, the meadow mouse (Microtus pennsylvanicus) remains were 3,357 individuals. Deer mice (Peromyscus sp.?) came next with 714 individuals. Only four house mouse (Mus musculus) remains were found. The remains of thirty birds found represented horned larks, snow buntings, English sparrows and tree sparrows. Sixty-eight pellets of Long-eared Owls collected from the vicinity of a nest in the spring of 1941 contained the remains of 63 meadow mice, 13 deer mice, 4 meadow jumping mice (Zapus hudsonius), 3 mole shrews (Blarina brevicauda), and 2 slate-colored juncos."

Food Habits: Of toad, Great Plains

Telford, H. S., and J. A. Munro. Toads feed upon sweet clover weevils, North Dakota Agr. Expt. Sta. (Fargo) Bimonthly Bulletin, 6(4), March-April 1944, pp. 35-37, 1 table.

Great Plains toad. Report on examination of 74 specimens, giving frequency of occurrence and volumetric percentage of the principal food items. Sweetclover weevils (Sitona cylindricollis) led in both respects; they contributed a third of the bulk of the diet. Up to 130 specimens had been taken by a single toad. A number of other food organisms identified are commented upon.

Life Histories: Gila monster

Woodson, Weldon. Gila monster, New Mexico Magazine (613 W. Gold Ave., Albuquerque, N. Mex. 15 cents a copy), 22(3), March 1944, pp. 19, 33-34, 2 photos.

Status and characteristics of the Gila monster as the only poisonous lizard; notes on life history. The numbers of Gila monsters are steadily decreasing.

Life Histories: Gull, Laughing

Noble, G. K., and M. Wurm. The social behavior of the laughing gull, Ann. New York Acad. Sci. (Eunice T. Miner, Central Park West at 79th St., New York, N. Y.), 45(5), pp. 181-220, 10 figs., Dec. 1943.

Report on studies in Massachusetts and New Jersey. The results are discussed topically and compared with those reached by students of gulls in other parts of the world. There are three pages of bibliography. Authors' summary: "The laughing gull colony is subdivided into a number of distinct groups during the breeding season. The area occupied by each group serves as a communal courtship ground in which pairs form, and is also the center about which nests are distributed according to restrictions of the environment. Nests are located in relatively dense vegetation and this is correlated with the presence of comparatively small nesting territories. Territory defense is carried out on the ground and in the air. The communal courtship area is adapted to provide the maximum number of contacts between many birds that are in an optimal physiological state for reproduction. The first social contact between sexually active gulls is stimulated by the long call. Sex recognition is mediated by a behavior pattern, essentially aggressive in character, which is initiated by the male and to which males and females react differently. The initial bond of the pair is reinforced by courtship display and courtship feeding which continue throughout the incubation period. Successful copulations occur only after the male secures sexual dominance over the female. This dominant-subordinate relationship is under physiological control and expressed by 'charging' and 'food-begging' behavior. A preliminary account of the sexual behavior of the Australian silver gull, L. nova-hollandiae, indicates that this species employs behavior patterns that closely resemble those of the laughing gull. Fundamentally the same behavior patterns appear to exist throughout the Laridae."

Life Histories: Jay, Florida

Amadon, Dean. A preliminary life history study of the Florida jay, Cyanocitta c. coerulescens, American Museum (New York, N. Y.) Novitates, No. 1252, 22 pp., tables, Jan. 1944.

The author regards the genus Aphelocoma as includable within Cyanocitta and that the western races along with the Florida jay are subspecies of a single species. In this preliminary paper, the author discusses the habitat and general behavior of the scrub jay, and gives information on food habits, calls and song, courtship, nests and nest-building, egg-laying, incubation,

care of nestlings, relations to other birds, and reaction to disturbances in the nesting cycle. Bibliography of 28 titles.

Life Histories: Muskrat

Dozier, Herbert L. Color, sex ratios, and weights of Maryland muskrats, II, Journ. Wildlife Management (P. F. English, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 8(2), April 1944, pp. 165-169, 1 fig., 3 tables.

Author's summary and conclusions: "The 1942 catch of 6,735 muskrats on the Blackwater National Wildlife Refuge represented a decline of 32 per cent from the catch in 1941. There were 6,496 adults but only 239 kits (1 lb. 6 ozs. or less), a distinctly smaller percentage of kits (3.5%) than that reported for the 1941 catch (4.5%). The black color phase again predominated slightly over the brown but the difference was not significant. There were 3,373 brown and 3,463 black animals (49 to 51%) as against the 1941 catch of 4,591 brown and 5,304 black (46 to 54%). Differences in color between the [animals from] various trapping units appeared highly significant. The sex of 6,384 adults and 239 kits in 1942 was determined accurately. The adults comprised 3,749 (58%) males and 2,635 (42%) females; the kits 114 (48%) males and 124 (52%) females. There was an adult ratio of 143 males per 100 females and the larger number of males was highly significant. Tabulation of the male to female ratio by months shows conclusively that the preponderance of adult males over adult females was maintained throughout the trapping operations in both years. Weights were obtained for 6,343 adults. The average for all adults was 2.2 pounds (998 grams); 1,831 brown males averaged 2.3 pounds (1,043 grams), and 1,271 brown females 2.2 pounds (998 grams); 1,898 black males averaged 2.3 pounds and 1,343 black females 2.2 pounds. These averages are identical with those reported for 1941 on 9,311 adults. The average weight for all adult males was 2.3 pounds and for females 2.2 pounds, showing that males are consistently slightly heavier than females. Differences in weight between the brown and black color phases and between the sexes are not significant."

Life Histories: Prairie dog, Gunnison

Longhurst, William. Observations on the ecology of the Gunnison prairie dog in Colorado, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 25(1), Feb. 1944, pp. 24-36, 1 pl., 5 figs., 3 tables.

The subspecies studied (Cynomys g. gunnisoni) was selected for one reason because it is one that has survived control operations in numbers large enough to repay ecological study. The author describes the general habits of the animals, their burrowing activities, reproduction, growth, food habits, enemies, parasites, and economic importance. Foods are tabulated as to frequency of occurrence in 157 stomachs. Grasses outranked all others. The animals definitely conflict with the best interests of livestock on the range and to some extent with those of cultivated crops. The prairie dog should be controlled, "not necessarily to the point of extinction, but sufficiently so that it is no longer detrimental to agriculture and the livestock industry."

Life Histories: Shrew, Least

Hamilton, W. J., Jr. The biology of the little short-tailed shrew, Cryptotis parva, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 25(1), Feb. 1944, pp. 1-7, 1 pl.

Notes on distribution, abundance, and habitat; measurements, weights (4.4-5.7 grams), and moults; food (insects, centipedes, earthworms, mollusks), including rapidity of digestion and quantity of food of captives; reproduction; and behavior. Bibliography of 10 titles.

Life Histories: Skink, Skilton's

Tanner, Wilmer W. Notes on the life history of Eumeces skiltonianus skiltonianus, Great Basin Naturalist (Brigham Young University, Provo, Utah. 50 cents a copy), 4(3-4), Dec. 1943, pp. 81-88.

Notes on nesting and nest guarding, eggs and young, general habits, and food; table of measurements and scale counts of 23 individuals.

Life Histories: Squirrel, Bryant's fox

Dozier, Herbert L., and Harold E. Hall. Observations on the Bryant fox squirrel, Maryland Conservationist (514 Munsey Bldg., Baltimore, 12, Md.), 21(1), Winter 1944 (April), pp. 2-7, 6 photos, 1 table.

Sciurus niger bryanti, a subspecies apparently restricted to the Eastern Shore of Maryland. Color, size, and weight are discussed and details in the last two respects given in a table. There are also notes on habitat, general habits, nest-building, food, breeding, and parasites and diseases. Destruction of habitat and hunting have greatly reduced the numbers of this form and protective measures are much needed.

Life Histories: Swift, Mountain

Stebbins, Robert C. Field notes on a lizard, the mountain swift, with special reference to territorial behavior, Ecology (Prince and Lemon Sts., Lancaster, Pa. $1.50 a copy), 25(2), April 1944, pp. 233-245, 2 figs., 1 table.

Sceloporus graciosus gracilis; California. Procedure and site of the study are described, and evidence obtained through the study of marked individuals discussed as to territoriality, feeding habits, behavior, growth, and reproduction. Each lizard is restricted in movement within the habitat, females more so than males. Competition both intra- and inter-specific is unimportant. Carpenter ants (Camponotus) are an important article of diet. Adults showed evidence of memory.

Life Histories: Turkey

Baker, Gerald F. Notes on the wild turkey in western Kentucky, The Kentucky Warbler (Harvey B. Lovell, 3011 Meade Ave., Louisville, Ky.), 19(3), Summer 1943, pp. 25-37, tables.

The foods used by turkeys on the Kentucky Woodlands National Wildlife Refuge are listed in seasonal tabulations. Acorns and other oak products are of most importance. Mating habits, as described, seem considerably like those of the ring-necked pheasant. Nest destruction by a variety of agents is the chief limiting factor. Average brood size in 1942 was 7. Wintering flocks vary in size up to 110, average 20, individuals. The birds range from 10 to 15 miles per day and cover about the same route for weeks together.

Life Histories: Wolf

Stebler, A. M. The status of the wolf in Michigan, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 25(1), Feb. 1944, pp. 37-43, 2 figs. (maps), 4 tables.

Wolves once occurred throughout Michigan; now they are almost entirely restricted to the Upper Peninsula. The animals avoid areas much affected by man, hence are disappearing with destruction of the wilderness. In recent years, the average number of wolves presented for bounty has been 33 and the animals can hardly be considered numerous. The hunting and feeding habits are briefly described and lists are presented of the food items identified from 8 stomachs and 8 scats. Wolf depredations upon deer are relatively insignificant. In fact, despite all causes of loss, deer are increasing to such an extent as to menace their food supply. There is real danger of the wolf being extirpated from Michigan. Bibliography of 10 titles.

Management

Bump, Gardiner. Wildlife management--fact and fancy, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 323-328.

Discussion of what can and what can not be accomplished by programs of: protection, artificial propagation, manipulation of environment, research, and education. Rather pessimistic, referring to "a bushel of failures and a half-pint of successes" and to doubts "as to our ability to correlate and bring to bear the fruit from much of our research." "The next 15 years will surely tell whether wildlife management becomes a fact or just a fancy." [Yet there will be management whether of the present, or another, brand.]

Management: Attracting birds

Peterson, Alvin M. Your bird sanctuary, The Passenger Pigeon (N. R. Barger, 4333 Hillcrest Drive, Madison, Wis.), 5(4), Oct. 1943, pp. 81-89, 5 photos, 3 charts.

There is hardly a yard so small and unpromising that it can not be made into a bird sanctuary. Moreover, it can be done at little expense. The author makes suggestions as to bird baths, feeding trays, nest boxes, and planting. The charts convey additional hints; list trees, shrubs, and vines to plant; and show the birds attracted to a 20-acre farm with a 2-acre sanctuary, noting features that probably attracted them.

Management: Bears

Murie, O. J. Progress report on the Yellowstone bear study. National Park Service (Merchandise Mart, Chicago 54, Ill.), 13 pp., 3 tables, 1944 (mimeographed).

A preliminary but informative discussion on an investigation begun in July 1943. The bears' reaction to man (and the reverse), driving the animals away, food, especially dependency upon garbage, and recommendations as to management and future work are features of the report. Author's summary: "A study of food habits x x x shows that grizzlies and black bears are largely vegetarian x x x Vegetation comprises 81.17% of their food; insects (with incidental debris) 9.13%; mammals 2.05%; and garbage 6.24%. It was found too, that even at the campgrounds, where bears habitually sought garbage, natural food still constituted 89.28%, garbage 10.48%, though certain types of garbage not readily identified, or that do not leave an appreciable amount of residue, would no doubt raise the percentage of garbage slightly. It is concluded that there is ample natural forage for bears and that garbage is not required to support the bear population. It is further concluded that although the bear is largely vegetarian, it has a strong desire for meat and foods included in garbage and that its actions are unquestionably influenced by the presence of such food resources. It is pointed out that the bear is a shrewd, unusually resourceful animal, easily adaptable to many situations, easily tamed in the presence of men, and that therein lies our problem. Another fact enters the problem--the misconceptions in the minds of tourists, their assumption that the park bear is a harmless or semidomesticated animal. Driving bears away, inflicting punishment on them personally, are no permanent help. Electric devices have proven fairly successful, when operated automatically and disasociated from the presence of man.

"It is planned to continue food habits studies, with special attention to spring and early summer, and the relationship with elk in the calving season. It is also planned to experiment with electric devices on garbage cans and car windows as deterrents in special cases, to 'cure' certain individual bears of their raiding habits. It is recommended specifically to produce a bear-proof garbage container as the first step, and obtain the full cooperation of the concessionaire, prior to any intensive program of enforcing regulations on tourists."

Management: Big game

Peck, Allen S. Wildlife management on public lands--an opportunity not a problem, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 67-72.

Wildlife, in addition to being a source of meat, is responsible for much of an important land use--recreation--in the western United States. The author lists 7 public land values, gives the extent of such lands in the West, and emphasizes the need and opportunity for good management. The leading features of big game management (including competition with range cattle) are discussed and the following conclusions drawn: "(1) Definite provision is absolutely essential for joint consideration of management needs and agreement on programs by all agencies concerned. Cooperation, understanding, and mutual confidence among agencies are the first requisites for continued progress; (2) flexibility is the essence of big-game management--state game departments must have broad administrative authority to manipulate seasons, bag limits, open and closed areas; (3) public educational effort should be strengthened. Effectiveness depends in large measure on the degree of coordination and unity between state and federal agencies; (4) winter range is the limiting factor in game production--no point to increasing herds on summer range beyond winter capacity; (5) hunter harvest is the best means of controlling big-game herds--may need to be supplemented in certain localities, but the success of any large-scale removal of excess numbers by other means than hunters is doubtful; (6) large populations in excess of hunter demand or beyond possibility of hunter control should be foreseen and guarded against."

Management: Bobwhite

Authors. Quail investigations in Louisiana, Louisiana Acad. Sciences (Dr. St. John P. Chilton, Secy., Dept. of Botany, Louisiana State University, Baton Rouge. $1.00 a copy), 7, 1942 (1943).

I. Analyses of reported returns from artificially-raised bob whites in 1941, by John S. Campbell, George H. Penn, Jr., H. Eugene Wallace, and M. George Greig, Jr., pp. 38-43, 4 tables.

Of birds released in pairs in spring, 61 percent of the pairs raised coveys averaging 13 each--30 percent were killed by predators or accidents, and the remainder dispersed or were unaccounted for. The kill during the hunting season included only 2.49 percent of the spring-released birds and their progeny. Of the birds liberated in groups of 10 to 20 in fall, 19 out of 48 groups apparently continued as covey units while 27 mingled with wild birds. On the whole these birds remained near the point of release, only exceptional individuals moving distances of from 1/8 to 2-1/2 miles. The hunting kill included 6.67 percent of these fall-released birds. Results obtained by other investigators are compared. Bibliography of 6 titles.

II. Inventory of bobwhite in northern Louisiana, by George H. Penn, Jr., and H. Eugene Wallace, pp. 43-48, 2 tables.

Description of the sample area method used and of the mathematical treatment of the data collected. Figures presented for 26 parishes for two seasons indicate an increase of 66.8 percent in the number of the birds in the second year. There appear to be more quail in the agricultural, than in the forested, parishes. The main value of the inventories is in revealing trends rather than in attaining very exact results as to actual sizes of the popula-

tions. Considering the number of quail probably killed by hunters, the authors recommend reduction in the open season and in the bag limit. Bibliography of 6 titles.

III. A study of the grit requirements of bobwhites by gizzard analyses, by George H. Penn, Jr., pp. 49-56, 4 figs., 3 tables.

The birds show no preference for any one type of mineral matter but rely upon whatever is most easily available. Medium-sized particles are preferred; measurements are given and the proportions of various sizes taken are tabulated. The amount present ranged from none to 2.29 grams, averaging 0.29 gram. The greatest number of pieces was 158, the average 26.7. Details are given and the findings are discussed. Lead shots were found in 7.21 percent of the gizzards. Bibliography of 5 titles.

Management: Burning

Bickford, C. A., and John R. Curry. The use of fire in the protection of longleaf and slash pine forests, Southern Forest Expt. Station (New Orleans, La.), Occasional Paper 105, 22 pp., figs., tables (mimeographed), Aug. 1943.

The title of this paper shows that some foresters have come a long way from the prevailing stand of their profession in admitting that fire can be used to protect a forest. While the findings of Herbert L. Stoddard are not mentioned in this paper, they, together with the researches of S. W. Greene and associates, are what brought foresters to the point of considering fire in the longleaf pine region a special case, and as here demonstrated, of recommending its use in forestry practice. The leaflet treats fire protection, use of fire, planning operations, and judging results, and in those respects is a useful manual. It proposes, not very convincingly, the substitution of the term "prescribed burning" for "controlled burning." The latter is a good, honest term that says what it means and means what it says. It has been perverted only in the mouths of propagandists.

Management: Cover, Roadside

Michaud, Howard H. Treatment of highway rights-of-way for erosion control, beautification, wildlife habitat and water conservation, Proc. 1943 Conservation Conference Indiana Division Izaak Walton League of America (Howard H. Michaud, 1205 Kensington Blvd., Fort Wayne, Ind.), pp. 18-19.

Discusses the value properly-directed highway landscaping may have in providing cover and food for wildlife.

Management: Ditchbanks

Yeager, Lee E., and Ralph E. Yeatter. Ditchbank management. Correlation of sound farming and wildlife practices, Illinois Conservation (Dept. of Conservation, 121 State House, Springfield, Ill.), 9(1), Spring 1944, pp. 20-23, 4 photos, 1 map.

In the intensively farmed black prairie belt, ditchbanks are very important coverts, travel-ways, and sources of food for wildlife. Their management is discussed under the heads: Ditch construction, development of herbaceous and permanent cover, burning and grazing, and advantages of management. Proper construction and care of the ditches are sound farming practices, hence farmers will benefit from ditchbank management totally aside from returns from wildlife. For details as to these values, see the article by Yeager abstracted in this issue of WILDLIFE REVIEW, page 34.

Management: Dove, Mourning

McClure, H. Elliott. Mourning dove management, Journ. Wildlife Management (P. F. English, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 8(2), April 1944, pp. 129-134.

Although comparatively neglected in research, the mourning dove is one of the major upland game birds. Information on the numerical status of the dove is reviewed and provisions as to hunting of the species summarized. Arguments as to if, where, and when the birds should be shot are presented. "The A.O.U. Committee on Bird Protection recommends drastic reduction of both the length of the season and the bag limit." The characteristics of the species bearing upon management are discussed and the following suggestions made for the northern states: "(1) The dove is adaptable and will nest nearly everywhere but it prefers trees and shrubs. Continued planting of shelter belts in the West, replacing orchards in the Midwest, and planting evergreen windbreaks about farm buildings will offer additional nesting places; (2) planting shade and fruit trees in towns to replace those that have died in recent dry years will further increase the nesting area; (3) in drier regions, the fencing off of small plots near overflowing windmill tanks will furnish drinking places; or the simple procedure of placing blocks of wood in open tanks will enable the birds to reach the water; (4) since the dove is not specialized in its food habits and eats nearly any seed it can swallow, no special measures for its food need be taken in the North. In the South, food plots of dove weed, partridge pea, cow pea, or other small seeded plants occasionally may be advisable. But in the main, food is rarely a limiting factor for the dove."

"In summary, mourning dove management should include no hunting of the bird in the northern half of its range and controlled hunting in its winter range. This is necessary because of its long breeding season and early migration, because the bird is considered a song bird in the North, and because it is beneficial in its food habits." Bibliography of 19 titles.

Management: Dove, White-Winged

Arnold, Lee W. The western white-winged dove in Arizona, Arizona Game and Fish Commission (Phoenix), 103 pp., 40 figs., tables, 1945.

Report on a Federal Aid in Wildlife Restoration investigation of factors influencing management of this bird, in continuation of the studies of Johnson A. Neff of the Fish and Wildlife Service noticed in WILDLIFE REVIEW, Nos. 27, May 1940, pp. 19-20, and 28, August 1940, p. 27. The present paper includes

summaries of results obtained by the author and others at 8 study areas. This information is partially summarized as to range, food habits, nesting habits, nest mortality, migration, and status of the population. Facts especially pertinent to management are again presented in synoptic form and a management plan detailed. The fundamental cause of decline of the species in Arizona has been the long period of "middle of the nesting season" shooting, reduction of favorable nesting habitats, and other unfavorable influences connected with the spread of white men. Proper regulation of hunting is indispensable but development of water supplies and feeding grounds and the reservation of nesting areas also are recommended. Predator control is not a practical means of aiding the whitewing. Management should be based on accurate knowledge of the numbers of the birds, hence regular censuses should be made and the take accurately enumerated.

Management: Erosion control and wildlife

Bennett, Hugh H. How soil conservation aids wildlife, Audubon Magazine (1006 Fifth Ave., New York, 28, N. Y. 35 cents a copy), 46(2), March-April 1944, pp. 76-86, 11 photos.

Most if not all of the land-use measures advocated by the Soil Conservation Service are of benefit to wildlife. This "Service was the first agency, public or private, to recognize a distinct type of agricultural land best suited for the production of wild animals and wild plants." Such lands aggregate more than 33,000,000 acres in the United States. Instances are cited of increase in wildlife following the use of soil conservation practices, including strip cropping, tree and shrub planting, gully stabilization, range and pasture improvement, and pond construction. Refuges on lands administered by the Soil Conservation Service also are of considerable value to wildlife. "To date, farmers in 45 states have organized 989 soil conservation districts, embracing 563 million acres of land. Within this area there are about two and a half million farms. It takes no stretch of the imagination to see that with this great body of farmers and ranchers behind the conservation movement, better things are in store for the wildlife of the nation. These men and women hold within their hands the means to apply sound land-management measures beneficial to wildlife on half a billion acres."

Management: Field borders

Moore, George C. 746 miles of wildlife borders, Alabama Conservation (Alabama Dept. of Conservation, Montgomery. 5 cents a copy), 15(11), May 1944, pp. 5, 14, 2 photos.

Information on the amount of seed produced and used in the planting of field borders which, through controlling erosion and increasing fertility, incidentally improve food and cover for wildlife. Farmers and cooperating agencies are well pleased with the results so far attained. Quail, songbirds, and rabbits are utilizing the borders. Conclusions as to management are: "(1) Preparation of the seed bed and weather conditions immediately following planting were controlling factors in securing a stand; (2) if a good seed bed is prepared and weather is favorable, 10 pounds of sericea will give a suffi-

cient stand; (3) cutting bicolor to the ground occasionally causes a stand improvement; (4) release cutting is unnecessary and impractical unless available land is a limiting factor; (5) it makes a much better border if the sericea strip is made a standard width and all space between the sericea and the woods is filled with bicolor." These names refer, of course, to species of Lespedeza.

Management: Forest wildlife

Hosley, Neil W., Chairman. What can forest wildlife contribute to the war program?, Journ. Forestry (Mills Bldg., Washington, D. C. 50 cents a copy), 42(5), May 1944, pp. 361-363, 1 table.

An estimate of the meat obtained from game animals on forest lands in 1942 is presented: more than 100,000,000 pounds valued at $42,000,000. Problems in harvesting this food and of controlling overpopulations are considered. Illustrative of recreational values is the use made by hunters, trappers, and anglers of national forests in 1942; 2,649,000 people putting in 6,400,000 days. In addition other people, totaling 27,259,000, visited the forests, most of them doubtless deriving some recreation from wildlife. "Under proper management forest wildlife could contribute much more to the war program in the form of meat, fish, skins, furs, fats, and recreation than it is now doing. Frequently this contribution could be made to the advantage of the wildlife itself through the removal of surplus populations. Some way must be found, both in war and in peace, to harvest the allowable crop and at the same time to retain public support of conservation measures."

Management: Fur animals

Lay, Daniel W. Some aspects of administration of the fur resources, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, D. C. $1.00 a copy), pp. 308-310.

Texas trap lines harvest $2,000,000 of new wealth in fur and meat each winter. The fur resource is distinctly worth good management which demands a balanced program of legislation, education, and research. Restocking of animals yielding high-priced furs is justifiable. However, the fur resource and its management are at present comparatively neglected.

Management: Fur animals

Yeager, Lee E. Fur production and management of Illinois drainage system, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 294-301, 1 pl., 2 tables.

The features of drainage ditches that make them attractive habitat for fur bearers are described and the numbers of the animals living along them (as indicated by catches) are discussed and tabulated. In two seasons on samples 65 to 67 miles in length, the average take per mile of all species was 30.1, of which muskrats numbered 27.7. The food habits of this species are described.

Trapping rights commonly bring a rental of $20 per mile of ditch. Management to the extent of preventing grazing and vegetating the ditch banks is advisable. The planting of willows is not recommended. They exclude other vegetation, tend to choke the ditches, and require periodic removal. Author's summary: "Drainage ditches, a physical feature of prairie farm land in the Central States, are an important habitat of muskrats and minks, and offer denning and foraging grounds to skunks, opossums, red foxes, weasels, and raccoons. Ditch-trapped furs in Champaign County averaged $29.23 per mile in value in 1938-40. At this rate the 6,500 miles of ditches on the entire Illinois black prairie produced $190,000 annually during the same period. Practices suitable for fur animal production on ditches are also desirable from the agricultural standpoint, and in addition, offer better cover for upland game."

Management: Game as a food resource

Leonard, Ross. Wildlife management in wartime, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 89-92.

In a year Utah wildlife contributed more than nine million pounds of meat to the public supply. For Colorado, the amount was 11,715 tons. Harvesting by hunters is the preferred method of regulating populations but officially managed killing is sometimes necessary to control depredations. The food crop should be taken but the war emergency should not be accepted as an excuse for inroads on wildlife resources.

Management: Game on national forests

Schilling, E. A. Regulated wildlife management areas on the National Forests in the South and Southeast, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 102-108.

The types of hunting used to reduce an overpopulation of deer on the Pisgah National Game Preserve, N. C., are described. Hunts from 1936 to 1942 were effective in cutting the deer numbers in half. The plan developed on the Pisgah has the following advantages: "(1) Developing the wildlife resources and utilizing these on a sustained yield basis; (2) managing the game animals so as to retain populations that are commensurate with the carrying capacities of the range; (3) permitting limited numbers of hunters and fishermen to harvest the surplus crop; (4) charging hunters and fishermen reasonable fees for good hunting and fishing as a reimbursement to the state and the Forest Service for the cost of protecting and developing the areas, and (5) providing a means for practical cooperation between the states and the Forest Service on a 50-50 basis, by assigning half the work and half the revenue to each." These ideas have been well received in the South and are now being applied on 25 game management areas, totaling more than 1,500,000 acres. Their administration is described. "The wildlife use of the forest competes economically with the timber use and the livestock use. It must, therefore, be considered worth paying for just as are stumpage and grazing privileges. x x x this plan puts to its

highest use, on a thoroughly democratic basis, one of the great resources of the national forests, and it fits this use into the national forest multiple use program in the best interests of the public and the sportsman."

Management: General

Stevens, Ross O. Talk about wildlife for hunters, fishermen, and nature lovers, Bynum Printing Co. (Raleigh, N. C. $3.50 a copy), 229 pp., frontis.+ 97 figs., 1944.

Much needed, forthright talk about weaknesses in present-day wildlife management. A lasting structure can be built only upon a firm foundation, which must include well-trained technicians whose operations are backed by the landowners and sportsmen. The functioning of state conservation departments is discussed by the aid of examples, less vulnerable, and more vulnerable, to political influence. Problems arising from different concepts as to the ownership of game are illustrated by the strife over the Pisgah deer between Forest Service federal and North Carolina state authorities. The writer argues for state ownership of wildlife (except migratory birds) to be held in trust for all the people and so administered. Through practical control of the environment and of much of the hunting of game, the landowner is a very important factor, always to be seriously considered in wildlife restoration and administration programs. Sound laws enforced in the spirit of fairness to all are a necessity; in this phase of the work it is especially requisite to exclude politics. Through public education lies the salvation of wildlife resources, but an educational program can be sound only so far as it is based upon facts. Well-planned research must precede efficient wildlife administration. The author's remarks on research, those who do it, and those who control it, are shrewd and to the point. He urges a wider research program than has ever been adopted under the license fee method of raising funds, supported in part through general taxation. Answers to a questionary to state game departments on artificial propagation are analyzed. Sentiment is still preponderantly in its favor and "it is definite," says the author, "that up to a certain point artificial propagation has been very beneficial in many states." On the other hand, much money (not to speak of valuable bird lives) has been wasted in restocking operations, the chief urge for which was publicity, rather than game restoration, values. Recent experience has shown that a better plan is encouragement of natural propagation by manipulation of the environment, which to be achieved on an important scale must have the widespread cooperation of landowners. The North Carolina cooperative farm game program is described as illustrative. The management of waterfowl, big game, fur-bearers, rodents, and predators (including the use of bounties) also are discussed.

The chapter on fire and wildlife is based upon recent findings (from those of Stoddard in the Cooperative Quail Investigation) as to the utility of controlled burning--a subject that has been badly misrepresented by propagandists. The protection of song and insect-eating birds and other small non-game is desirable but should be financed from general funds to a larger extent than has been done. Conservation of plants and fishes, and the relationships to wildlife of pollution and drainage are other topics to which chapters are devoted. There is a terminal sketch of the values of wildlife and an appendix

presenting the model Fish and Game Administrative Code devised by the International Association of Game, Fish, and Conservation Commissioners. A plain-speaking book but one that should carry weight with the sportsmen because its author is one of them and in sympathy with their legitimate objectives. Its message should be helpful to a wide variety of persons interested in the conservation and management of wildlife.

Management: Grouse, Prairie

Schrader, Thomas A., and Arnold B. Erickson. Prairie chickens and sharp-tails, Conservation Volunteer (Minnesota Dept. of Conservation, State Office Bldg., St. Paul), 7(40), May-June 1944, pp. 33-37.

Alteration of environment and overshooting have greatly depleted the numbers of these birds in Minnesota. Perpetuation of the prairie chicken will be impossible unless grasslands can be preserved and protected from fire and overgrazing, flushing bars used while mowing, and booming grounds left unplowed. Tax delinquent lands might be managed by the State to good effect. Maintenance of environment and protection of the species during low of its cycle are recommended for the sharptail. Research should be done as a guide to better management of both species and hunting should be permitted only when there is a definite surplus.

Management: Harvest

Glading, Ben, and Roy M. Saarni. Effect of hunting on a valley quail population, California Fish and Game (Ferry Bldg., San Francisco, 11, Calif.), 30(2), April 1944, pp. 71-79, Figs. 33-35, 4 tables.

Report upon an investigation to determine what percentage of the fall population of Lophortyx californica could be killed without damaging the recuperative capacity of the seed stock. Experimental and check areas in Madera County were studied during four hunting seasons. War conditions then interrupted the work. From authors' summary: "(1) The observed valley quail population on the San Joaquin Experimental Range was apparently able to withstand an annual bag kill of 25 per cent of the fall population plus the incident cripple loss; (2) reasonable hunting is less likely to affect a valley quail population through a series of years than are other factors; (3) movement of quail probably did not play a major part in replenishing their numbers on the hunting area. This was indicated by the results from an extensive banding program carried on to the east of the hunting area; (4) hunting and check areas several times larger than those used in this study are desirable to minimize boundary effects (local movements, etc.); (5) no apparent correlation was found between the pre-season number of quail and the birds taken per hunter, birds per man hour of hunting, or shells used per bird bagged; (6) there is indication that hunters using dogs lost fewer quail as cripples than those without dogs."

Management: Herd regulation

Pickford, G. D. Range management includes big game, National Wool Grower (509 McCormick Bldg., Salt Lake City, Utah), 33(3), March 1943, pp. 18-19, 1 photo.

Competition between livestock and big game, especially elk, is in places severe. In some instances (particulars given), there being no adequate arrangements for big game control, it has been necessary to exclude livestock from ranges in Oregon and Washington. There should be dual control that will keep the combined grazing load from both classes of animals within carrying capacity. State game authorities need support in the inauguration and continuance of proper management measures.

Management: Inventory, antelope, pronghorned

Beer, James. Distribution and status of pronghorn antelope in Montana, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 25(1), Feb. 1944, pp. 43-46, 1 fig., 2 tables.

The author discusses estimates of earlier, and presents figures on recent, populations of antelopes in Montana. "Pronghorns are still found over much of their original range in Montana. While their numbers will never again approach the 2,500,000 head that originally roamed the prairies of Montana, they are increasing to a point where they may soon be numerous enough for an open season. [Hunting under permit was begun that year--1941.] It is estimated that there are about 14,233 head in Montana at the present time."

Management: Marsh

Hochbaum, H. Albert. The canvasback on a prairie marsh. American Wildlife Institute (Investment Bldg., Washington, 5, D. C. $3.00 a copy), xii+201 pp., col. frontis. + 18 pls., numerous other illus., tables, 1944.

This work seems to have been done under nearly ideal conditions. It had possibilities for original findings that have been realized upon, the author apparently having been allowed to do it in his own way. His attractive style of writing has received only "sympathetic" editing. He demonstrates proficiency in the several types of draftmanship employed to illustrate the book. It is in an unusually complete sense his own production, and deserves the commendation that is the need of a "labor of love."

It is the story of an Albertan marsh particularly as exemplified by the life history of the canvasback. There is much information upon other species but the "can" is always the central figure. The general characteristics of the marsh are described and the phenomena of the year are taken up under the heads of: Spring flight; courtship; the nesting, brood, and postbreeding, seasons; and the autumn and shooting season. The discussion of management is thoroughly related to pertinent biological factors. An appendix gives vernacular and technical names of organisms mentioned in the text. Five pages are occupied by a list of literature cited and about the same space by an index. An excellent production.

Management: Muskrat

Gowanloch, James Nelson. Louisiana muskrat industry as a source of human food, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 213-216.

Figures are given for the muskrat catch for the United States and Canada and leading subdivisions; that for Louisiana is nearly half of the total (which was about 3-1/2 million in 1939-40). The probable causes of this surpassing yield are discussed. The meat of the Louisiana muskrats has chiefly been wasted. Steps are being taken to alter this situation and to develop other economic uses of the animals, e.g. for their musk glands.

Management: Muskrat

McCann, Lester J. Notes on growth, sex and age ratios, and suggested management of Minnesota muskrats, Journ. Mammalogy (Ernest T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 25(1), Feb. 1944, pp. 59-63, 1 table.

Information is presented on weights, numbers in age and sex classes, and number of young. A theoretical life equation is given in tabular form. Author's summary and conclusions: "(1) The sex ratio of Minnesota muskrats in the period between fall and spring is approximately 1 female to 1.2 males; (2) a differential spring and summer mortality reduces the number of adult males and reverses the sex ratio by fall to 1.2 adult females to 1 adult male. Since the muskrat is loosely monogamous, a decrease in number of males should result in a commensurate number of barren females. It follows that it is unwise to set trapping regulations in such a manner that a differential take of males occurs; (3) a majority of males in the young of the year compensates for the natural losses among adult males in spring and summer; (4) the breeding season of muskrats in Minnesota begins in late March; (5) the female muskrat in Minnesota averages two litters a year of about six individuals each. Juvenile mortality reduces the number of young by trapping season to six young per breeding female; (6) the size and quantity of muskrats varies with conditions under which they develop; (7) juvenile muskrats increase in size during the winter months; (8) a reduction by trapping in December of not more than 50 percent of the total population is close to the safe limit for maintaining the population over a period of years." Bibliography of 5 titles.

Management: Overpopulations, deer

Holmes, Lawrie. Mount Desert deer, past and present, (Presumably obtainable from the author, Bar Harbor, Maine) 36 pp., illus., 1944.

Historical review of the populations of deer (other ruminants) and wolves on Mount Desert Island. There was an irruption about 1880, the effects of which combined with those of a severe ice storm in 1886 ended the period of excellent deer hunting on the Island. So many deer perished that a closed season was maintained for 10 years. A single open season demonstrated there

were no deer, so another decade of closure was tried. Deer were still very scarce about 1915, since which time open and closed seasons were tried with entire closure from 1931. However another irruption was in the making and by 1937 signs of food scarcity were noticeable. Damage to crops and gardens has become severe and poaching has been rife. The number of deer on the Island is discussed in relation to the food supply. Artificial feeding is useless except as an emergency measure and then should be done only by cutting that will make natural forage available. Evidence of malnutrition is presented. Management is needed. The case is presented for the information of citizens who must decide what shall be done. Four-page bibliography.

Management: Overpopulations, elk

Cahalane, Victor H. Elk management and herd regulation--Yellowstone National Park, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 95-100.

The circumstances that led to an overpopulation of Yellowstone elk are reviewed; in 1934 the number of animals was twice the estimated carrying capacity of the range. Other species were seriously affected, the white-tailed deer being completely, and the bighorn sheep nearly, extirpated. Plans were made to remove 3,000 elks annually until the size of the herd was reduced to conform to the carrying capacity of the environment. Various obstacles prevented realization of the program so that an average of only a little more than 2,000 animals were removed in each of 8 years. The excess number of elk remained as great as it was in 1934. It was therefore decided in 1942 to keep the hunting season open until effective reduction was achieved. The hunter take together with some official destruction accounted for 7,230 elks. Park kill was less than 10 percent of the whole. To restore the range, herd regulation must be continued. Additional winter range also should be obtained.

Management: Pheasant

Schrader, Thomas A. The ring-necked pheasant, Conservation Volunteer (Minnesota Dept. of Conservation, St. Paul), 7(39), March-April 1944, pp. 17-22, 1 table, 1 graph.

History of establishment of the species in the State, and of fluctuations in the population and the kill. Decreases appear to have resulted in part from open seasons on hens. Factors in the life history bearing upon population upkeep are summarized and a theoretical life equation is presented and discussed. Stopping the shooting of hens would have a greater effect than could any other factor in increasing the population and improving hunting. Taking special measures to protect nesting cover and setting aside small refuges also are recommended. The kill in each of the seasons 1941 and 1942 was in excess of 1,500,000.

Management: Planting beggarweeds

Kistler, J. M. Native beggarweeds for wildlife, North Carolina Wildlife Conservation (Division of Game and Inland Fisheries, Raleigh, N. C.), 8(4), April 1944, pp. 8-11, 2 photos.

Beggarweeds (Meibomia) are soil-improving plants, the seeds of which are eaten by several species of birds and mammals and the foliage of which is palatable to deer and cattle. Directions are given for planting and growing beggarweeds; they can be cut for hay and still produce a crop of seed, which may be as much as 400 pounds to the acre.

Management: Planting for birds

Jensen, Zora S. List of native plants and shrubs that can be planted for bird food, Chat (John Grey, Jr., State College Station, Raleigh, N. C.), 7(4), Sept. 1943, pp. 56-57.

Table naming shrubs, vines, and trees, and annotating most of them as to habitat, soil preference, food quality, and fruiting season.

Management: Planting for wildlife and erosion control

Waring, P. A. Five farmers make a plan, Soil Conservation (Supt. of Documents, Washington, D. C. 10 cents a copy), 9(8), Feb. 1944, pp. 179-182, 1 map.

Story of how five farmers got together, made a plan (implemented by a map) for a long-time cover preserving and planting program in Bucks County, Pa. The aim is not game management but conservation of wildlife "for the sake of better land use, the sake of our crops." "Subdivisions of our Honey Hollow project are as follows: (1) Planting of hedges and shrub islands; (2) planting of woodland edges; (3) planting of windbreaks, roadsides; (4) stream development for better wildlife and farm use; (5) increasing of field edges by breaking up large fields into contour strips of crops." "Trees and shrubs grow slowly. It will be years before we have a showing for our work. But we know this. The cycle of farming is always long, and we have learned to understand this fact over the years. Nevertheless, we have the confident feeling that something is started that is good and in the direction of permanent agriculture for Honey Hollow."

Management: Refuges

Park, Barry C. Problems resulting from creation of refuges for big game, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 339-343.

Analysis of 100 percent returns to a questionary on the following topics: "(1) Problems resulting from creation of big-game refuge areas; (2) reasons for development of these problems x x x ; (3) recommendations for cor-

rection; (4) suggested future management practices to replace refuges, provided it is believed that big-game refuges should be abandoned; (5) overall or general state picture of results obtained from creation of big-game refuges; (6) history of one big-game refuge area." Author's conclusions: "From all of the information received, it appears that the strict refuge plan under certain circumstances was unsuccessful in increasing the numbers of big game, but generally it resulted in overpopulation which could not be controlled in time to save the herd from self-destruction. Public sentiment and the lack of coordination between responsible agencies were important factors blocking remedial action. It is concluded that the problems were caused primarily by an inflexible system of management, and that the refuge plan was only one of the contributing factors. In accordance with the recommendations made by the states, as given under the paragraph 'Recommendations for Correction,' the solution to the problem appears to be: (1) Delegation of complete regulatory authority to state game commission; (2) division of state into management areas, the boundaries of which, in so far as possible, follow natural features of topography, roads, railroads, et cetera; (3) development of a coordinated and flexible management plan, involving all state and federal agencies concerned; (4) this plan to present a unified approach to wildlife management on the area, including a good public educational program."

Management: Small game

Chase, Warren W. Methods of utilizing small game crops during wartime in the Midwest, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 229-233.

Recent developments in the management of wildlife has prepared the way for satisfactory wartime handling of the resource. Restrictions on personnel and funds have necessitated some changes from the normal but "production and protection of game is going on about as usual with some enlarged territories for the protection forces. There is a gradual reduction in the game-farm program, and most states are attempting only to maintain broodstock. There is little chance for any restocking and it is generally agreed that seed stock in the field is sufficient." Research and development have been reduced but education and post-war planning are being emphasized. Handicaps resulting from the emergency are expected to have a greater effect upon hunting than upon administration. Thus the control of partly injurious species ordinarily exerted by hunting may be insufficient at this time. For that reason and to make a full meat harvest, special efforts should be made to approximate the normal take. Standards should in no wise be lowered and adherence to the American Game Policy is recommended. "The handling of small game in the North Central States is on a far sounder basis now than it was during the last war. We now consider it a crop to be managed, harvested, and used. It has a place with other natural resources and is a part of the soil and land management scheme designed to maintain high yields regardless of the amount or the final use of the product. Small game has definitely responded to land treatment. Even in the best of the corn belt 2 to 4 per cent of the land is being devoted to the benefit of rabbits, pheasants, ducks, squirrels, and many other of the smaller creatures." "Agricultural interests have accepted the principle that

game is a valuable product of the land, and not just something to be exterminated. The farmer is the greatest manager of small game."

Management: Small game

Davison, Verne E. Methods of utilizing small game crops during wartime in the Southeast, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 224-228.

On the basis of ample field experience in the region, the author discusses the effect of wartime conditions upon: Individual consumers, state administrators, species of wildlife, and wildlife management. Hunters, while somewhat handicapped, probably will be about as active and successful as usual. "Conservation leaders might well dispense for the duration with extreme views of personal hardships and encourage a sportsmanlike acceptance of restrictions while still enjoying a measure of recreation." Handicaps to the administrators mostly result from lower license sales. "A promising means of solving these administrative problems is a public campaign to encourage all hunters and fishers to support the state conservation department by (1) taking at least one outing for their favorite sport, (2) buying licenses as usual, and (3) obeying the laws and regulations carefully." Even if there is relatively unchecked increase in small game, it is not expected to cause much trouble in the Southeast. Rabbits, the most likely to increase and do damage, are harvested mostly by trapping so that ammunition shortage will scarcely alter the situation. In none of the three respects so far discussed is any drastic or permanent harm to wildlife conservation likely. Wildlife management, however, must keep abreast of improvements in technique and make advances upon them. The methods of a public works program will not serve as they have in the past. Instances of the improved findings are given. "Wartime production problems do not justify a stagnation of progress."

Management: Small game

Einarsen, Arthur S. Methods of utilizing small game crops during wartime on the West Coast, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 247-250.

Wartime conditions seem likely to benefit native small game. Immigrant workers may reduce populations of introduced game birds in the vicinity of large cities. The author especially urges effort to lower the crippling loss, estimated at about 60 percent of the total kill. This will save food and promote ethical sportsmanship. Proper dressing and care of game also might greatly increase the food poundage. Aiding in this respect also would be allowing a good daily bag for a short season rather than a small limit for a long one. Control of pheasant damage has been found necessary. Hunting by soldiers has not been, nor does it promise to be, extensive. Farmer-sportsman relationships are ever in need of tactful consideration.

Management: Small game

Goodrum, Phil. Methods of utilizing small game crops during wartime in the Southwest, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 240-246.

Ammunition and gasoline shortages had reduced and were expected still further to reduce hunting in the Southwest. The estimated take for 1942 included some 32 million pounds of edible meat (a figure that is distributed by groups). Estimates are given also of the head of game that can be taken, but extreme relaxation of the hunting regulations is not advised. Better care of wild meat is strongly recommended. Control problems may be somewhat increased by reduction in hunting. Difficulty is experienced in maintaining conservation department staffs; research activities especially are being reduced by loss of trained personnel. Law violations have sharply increased. Overgrazing is accelerating. Land use trends may affect unfavorably the future status of small game species.

Management: Small game

Murie, Olaus J. Methods of utilizing small game crops during wartime in the Great Plains region, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 235-238.

This paper, more of a report on the status of small game in the region referred to, contains an estimate of the 1942 take--about 43 million pounds in 6 states. The author maintains that hunter take has not been an important factor so far as the rabbit population of this area is concerned, hence war conditions can hardly be said to present anything new. He argues against lowering of standards, quotes the Kansas Forestry, Fish, and Game Commission to the effect that: "The recreational value of game is much larger than food value. More violations of game law come from from food concept of game," and goes on to say: "This, I think, is a thought that could well be kept in mind, even though in this emergency we do call attention to the value of game in augmenting our food supply. After all, there is the real danger of losing our perspective, in our enthusiasm to demonstrate that our wildlife can help win the war. Many unwise trends of thought can be initiated in a time of stress like this. In any activities that we undertake to harvest our game in an unusual manner or to an excessive degree to meet our food problem, it is necessary that the public understand the unusual character of the program. The public, as well as the administrators, should not be permitted to lose sight of the esthetics, the important intangibles that are associated with proper hunting of game. This is a problem even in peacetime. It becomes greater at a time like this."

Management: Small game

Pearce, John. Methods of utilizing small game crops during wartime in the Northeast, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 217-221, 1 table.

The author tabulates the estimated kill in 1942 of 14 groups of small game; finds it in numbers more than 26 million head and in weight of meat about 33 million pounds. The number of kills is about 10 per hunter (taking into consideration all license holders). Wastage should be held to the minimum, in part through a campaign of public instruction. Damage to orchards and crops by rabbits, squirrels, and other small game should continue to receive the amount of control due to the normal hunting take. If state game departments had greater discretionary powers, they could better cope with conditions greatly altered by wartime exigencies.

Management: Squirrels

Baker, Rollin H. An ecological study of tree squirrels in eastern Texas, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 25(1), Feb. 1944, pp. 8-24, 5 figs., 3 tables.

This report on investigations basic to management describes the areas and methods of the studies which were conducted by the quadrat system. Fluctuations in local populations were great and apparently paralleled those in food supply. Squirrels were most active in the morning. The grays outnumbered the fox squirrels in mixed bottom and hammock but were in about equal numbers in pure hammock. The author discusses behavior, especially in rut; food habits; prevalence of leaf and twig nests; weights and measurements; parasites; and management. Regulation of the kill is the most practicable measure. Bibliography of 8 titles.

Management: Stocking bobwhites

Baumgartner, F. M. Dispersal and survival of game farm bobwhite quail in Northcentral Oklahoma, Journ. Wildlife Management (P. F. English, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 8(2), April 1944, pp. 112-118, 1 fig., 3 tables.

A useful study of the value of stocking--a field in which ignorance and speculation have largely ruled. Author's summary: "A field study on the dispersal and survival of 1,064 game farm bobwhite released on an area in north-central Oklahoma yielded the following information: (1) Under favorable conditions for establishment, such as poor range conditions or a surplus of wild birds in the area stocked, neither adults nor young established themselves; (2) when environmental conditions were favorable, both adults and young tended to take up ranges within a mile of the point of liberation; a few individuals dispersed rapidly and moved from two to eight miles during a period of a few days to several months; (3) adult bobwhite liberated in the summer and autumn apparently were unable to cope successfully with conditions in the wild and did not provide stock for either hunting or breeding; (4) when environmental conditions were very favorable, it was estimated that as many as 50 per cent of the young furnished hunting in the late autumn and 45 per cent were available as breeding stock the following spring. A few survived the second summer; (5) survival of the birds that moved off of the area stocked was apparently so limited that they did not materially supplement the wild populations; (6) heavy restocking with game farm birds appears to be costly

and a rather futile method to increase bobwhite populations for either hunting or breeding stock."

Management: Stocking elk

Reese, Staber W. Wisconsin's elk herd, Wisconsin Conservation Bulletin (Wisconsin Conservation Dept., Madison), 9(4), April 1944, pp. 6-10, 5 photos.

The elk was extirpated from Wisconsin about 1860. Animals introduced in 1913 and 1917 have increased slowly but it is doubted that they will become numerous enough to warrant an open season.

Management: Strip-mined areas

Bristow, James W. Wild life havens and other potential uses of strip mine spoil piles, Proc. 1943 Conservation Conference, Indiana Division Izaak Walton League of America (Howard H. Michaud, 1205 Kensington Blvd., Fort Wayne, Ind.), pp. 11-14, 5 photos.

Strip-mined areas are present in 12 counties of Kentucky, 18 in Indiana, and 84 in Illinois. There has been considerable natural restoration of these areas but the process can be hastened and improved from man's point of view by reforestation and development of the water supply. Values to wildlife are emphasized.

Management: Transplanting beavers

Anon. The beaver comes back, Outdoor Indiana (401 State Library Bldg., Indianapolis, 9, Ind.), 11(2), March 1944, pp. 3, 14, 2 photos.

Those interested in the progress of beaver restoration will wish to consult this article. Beavers have been colonized from the Kankakee to the Ohio. They have done both good and harm but in general have been welcomed. Notes are given on their life history, natural enemies, and economic status.

Management: Transplanting beavers

Rasmussen, D. I., and Nolan West. Experimental beaver transplanting in Utah, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 311-318, 1 table.

Report upon investigations designed to improve methods. Authors' summary: "(1) An experimental beaver and transplanting program was carried out in Utah during July, August and September of 1940. A total of 150 beavers were trapped; (2) the Scheffer-Couch beaver live trap was used very successfully throughout the season. The Hancock beaver live trap also proved to be a successful trap, especially adapted for the trapping of steep banks and deep water; (3) sexes of all animals were determined without internal examination; (4) all beaver were tagged in each ear with a small strap type tag to insure

better chances of returns; (5) a sheet metal pen with a bottom of heavy screen was used to hold the beaver until time for transplanting. This pen could be dismantled and hauled flat in a pick-up; (6) beavers were transported in specially built crates which had watertight bottoms permitting holding of water when desirable." Bibliography of 8 titles.

Management: Wildlife management in relation to land management

Graham, Edward H. Land classification as a technique in wildlife management, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 360-369, 2 tables.

"Summarily, the gist of this paper is: The classification of land has been developed gradually in the United States, culminating in a classification according to use capabilities which is applicable to operating units of rural land, such as individual farms and ranches. Wise use of land is predicated upon such a classification which determines the most intensive use to which each parcel of land is adapted in accordance with its permanent productiveness. Thus some areas are adapted to intensive cultivation, others to less intensive cropping. Some lands can be used safely only when they are covered with permanent vegetation, as pasture or woodland, and still other areas are adapted to none of these uses but are most productive of a wildlife crop. For productive management of the latter areas the wildlife technician, along with the land operator, has full responsibility. Some areas best managed for wildlife, as ponds, field borders, and hedgerows, occur within many land classes and afford the wildlife manager an opportunity to modify even intensively cultivated areas for wildlife welfare. Only by a knowledge of the land and the uses to which it is best adapted can any land management technician--farmer, agronomist, agricultural engineer, forester, range manager, or biologist--hope to be successful with the manipulation of the products of the land, of which wildlife is one. Thus it seems that the wildlife manager can expect to produce permanent results only when he considers, along with costs involved and demand for what he produces, the adaptabilities of the land, the rightful place of wildlife improvements on different kinds of land, and the most effective manner by which he can correlate his recommendations with those of others who work upon the land." Bibliography of 9 titles.

Management: Winter feeding

Carhart, Arthur H. Fallacies in winter feeding of deer, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 333-337, 1 table.

Investigations revealed that prepared stock feed and alfalfa do not constitute a maintenance ration for mule deer. In fact the highest winter losses tended to occur where the greatest average quantities of these feeds were taken. Using such provender, the animals thrive only when they can also get liberal amounts of natural browse. Food studies showed browse to compose 97 percent of the normal winter diet. There are indications "that there cer-are

tain metabolic agents among the natural feeds selected from the range by deer that may be essential to their assimilation of domestic stock foods." Tests of mineral salts showed that they did not yield the needed element. "There is a place for winter feeding. When weather conditions reach a point where there is absolutely no native feed above the snow, all information indicates that deer can be carried for 2 or 3 weeks on emergency food of domestic stock types. The glaring fallacy that has emerged from the various portions of our studies under Pittman-Robertson in Colorado is the erroneous idea that we can hope to supply a sustaining diet through the entire winter feeding period by offering available domestic stock feeds. We, and many another state, have been killing our deer with pseudo-kindness. The feeding program, based on only superficial information and suppositions, is unsound at present. The clear indication is that the whole question of wintering deer in this region, rests on having sufficient natural feeds, almost exclusively browse, available to carry the herd in normal weather. And while the feeds that have been used may be the one and only solution at hand in a crisis when all native feed is unavailable because of snow, the idea that we can supply deer herds a sustaining ration by offering domestic stock feeds, is unsound, uneconomic and destructive."

Natural History: Birds

Hausman, Leon A. The illustrated encyclopedia of American birds, Garden City Publishing Co. (14 West 49th St., New York, N. Y. $1.98 a copy), xix+541 pp., more than 700 illus., 1944.

Exemplifying a new plan for a bird book, this volume treats in alphabetical sequence all of the forms included in the American Ornithologists' Union's Check-List of North American Birds (1,422 species and subspecies). For each species there is a brief description, statement of length, concise outline of the distribution, and notes on song, behavior, recognition marks, and sometimes other features. The subspecies are treated in a briefer, more comparative way. The book includes also a check-list of bird names in systematic order, an index of other than standard names, an index of scientific names of families, a register of state birds (the cardinal so selected by 5 states, the mockingbird by 6, and the western meadowlark by 7), and a bibliography of books useful to the layman in the study of birds. The introduction is largely devoted to directions for using the book. The author states that he made the book to answer the questions, which according to his experience of many years in teaching, are most frequently asked about birds.

Natural History: Fleas of Alaska

Jellison, Wm. L. Siphonaptera: A list of Alaskan fleas, U. S. Public Health Reports (Supt. of Documents, Washington, D. C. 5 cents a copy), 54(45), Nov. 10, 1939, pp. 2020-2023.

Seventeen forms with host and locality records. The hosts include mammals and birds.

Natural History: Herpetology of South Dakota

Over, W. H. Amphibians and reptiles of South Dakota (University of South Dakota, Vermillion. 25 cents a copy), 2nd ed., revised, July 1943, 22 pp., 9 pls. (processed).

Annotated list of 9 forms of amphibians and 28 of reptiles.

Natural History: Mammals of New York

Knobloch, Irving W. Mammals of Allegany State Park region, St. Bonaventure College Science Studies (St. Bonaventure, N. Y. 50 cents a copy), 12(1), Nov. 1943, pp. 5-11, 23, 2 photos; 12(2), Jan. 1944, pp. 13-23, 3 photos.

General account of the region, historical notes on some of the mammals, fallacies about animals of this group, their general biology, and value, annotated list of species, in which all families but the bats seem to be adequately represented. Bibliography of 32 titles.

Natural History: Reptiles of British Columbia

Carl, G. Clifford. The reptiles of British Columbia, British Columbia Provincial Museum (Vancouver, B. C., Canada. 25 cents a copy), Handbook No. 3, 60 pp., illus., April 1944.

Introductory matter includes statement of the general characters of lizards, snakes, and turtles, and of their means of defense. Myths and popular beliefs relative to these animals are reviewed and their economics briefly discussed. Keys to the species are presented. Each specific account includes a succinct description and statements as to distribution, habitat, and habits. Each is accompanied by an excellent figure. There is a glossary, a 6-page bibliography, and an appendix on the treatment of snake bite.

Natural History: Skunk

Sanderson, Wilford E. The skunk, School Nature League Bulletin (National Audubon Society, 1006 Fifth Ave., New York, N. Y.), 14(7), 4 pp., illus., March 1944.

Popular account of the appearance, characteristics, habits, and usefulness of the animal; intended for school use.

The Bulletins are offered on a subscription basis, 10 issues in a year for $1.00, or as a set of 80 already issued for $4.00. Most of them relate to animals, but the series includes also leaflets on plants, earth and sky, and miscellaneous subjects.

Natural History: Wildlife of Itasca Park, Minnesota

Swanson, Gustav. Wildlife of Itasca Park, Flicker (Arnold B. Erickson, University of Minnesota, Minneapolis), 15(4), Dec. 1943, pp. 41-49.

List of mammals and general notes on this group and upon the amphibians and reptiles of the Park. Bibliography of 7 titles.

Predation: Ground squirrels upon game bird eggs

Stanton, Frank W. Douglas ground squirrel as a predator on nests of upland game birds in Oregon, Journ. Wildlife Management (P. F. English, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 8(2), April 1944, pp. 153-161, tables.

This study was on the reactions of the ground squirrel and other marauders to dummy nests and on the behavior of captive squirrels, neither of which lines of investigation are very dependable as a guide to natural relationships. The author's conclusions, therefore, should be regarded as suggestive rather than definitive. They are: "(1) In Oregon, the Douglas ground squirrel will eat eggs of the pheasant and bobwhite quail, and therefore is definitely a factor in nesting losses of these game birds in that region; (2) the intensity of these depredations is of considerable importance. The squirrels are active throughout the nesting season and find a large percentage of the nests; (3) they may eat the eggs at the nest but, more regularly, carry off single eggs and, in the latter case evidently make repeated return visits; (4) observations and feeding experiments both show that only certain individual squirrels eat eggs; apparently they acquire a taste for the eggs. At times, a known 'egg-eater' will ignore eggs; (5) nest raiding is not proved to be greatest in any one month; (6) nests in proximity to squirrel burrows are particularly susceptible to destruction; (7) the degree of predation is not influenced by the naturalness of the habitat for game birds; (8) the size of the clutch apparently is not a factor in the probability of its discovery by a squirrel; (9) nests in grass or cultivated crop cover are more likely to be destroyed than those in weeds or brush; (10) there is some indication that nests along fence rows are particularly vulnerable to predation."

Research: Age determination

Ammann, George A. Determining the age of pinnated and sharp-tailed grouses, Journ. Wildlife Management (P. F. English, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 8(2), April 1944, pp. 170-171, 1 pl.

Immature birds have the tip of the second primary noticeably frayed; in the adult (winter plumage) it is unworn. The character may be of use in determining age in the turkey, and in sage, sooty, blue, and spruce grouses, but apparently not in the ruffed grouse.

Research: Age determination

Kirkpatrick, C. M. The bursa of Fabricius in ring-necked pheasants, Journ. Wildlife Management (F. F. English, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 8(2), April 1944, pp. 118-129, 1 pl., 5 figs.

Review of the literature (16 titles cited), account of advanced research, and refined definitions and illustrations pertaining to the characteristics of the bursa of Fabricius. Author's summary: "(1) The depth of the bursa of Fabricius in live ring-necked pheasants was measured by an instrument devised of glass tubing, a celluloid millimeter scale, and the rubber bulb of a medicine dropper; (2) to make the measurement: the dorsal lip of the vent is pulled posteriorly to expose the opening of the bursa within the cloaca; the scale is inserted into the bursa opening and gently rotated forward until its tip reaches the end of the cavity; and the depth of the bursa read where the edge of the bursa opening intersects the millimeter scale; (3) involution of the bursa was studied and measured in three flocks of game-farm pheasants of known and different ages. The earliest measurements were made during September; involution proceeds from then until late April, when most of the bursae no longer can be measured. Curves for the average bursa depth of pheasants hatched in different years do not coincide during the winter months, suggesting that the year of hatching influences the average depth on any given date. In the autumn the younger pheasants of the same year have deeper bursae, indicating that hatching date is important as regards bursa depth. In the spring some factor associated with season may cause the completion of involution in all the pheasants by late April; (4) the bursa was found in all juvenile pheasants, but not in adults, hence its presence is a positive indicator of the juvenile bird. Some bursae are involuted completely by January 1 following hatching, hence December is the last month during which adults and juveniles can be differentiated by this method."

Research: Color vision

Kalmbach, E. R. Birds, rodents and colored lethal baits, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 408-416, 1 fig.

In general the results of previous studies are to the effect "that diurnal birds do distinguish color and that mammals, other than the primates, perceive at best a restricted spectrum as judged by human standards." Experiments to learn the color discriminating capacities of bobwhites and English sparrows are summarized. Field observations are cited that show aversion on the part of birds to unnaturally colored foods. "On the basis of work done with English sparrows and house finches, supported less emphatically by observations on pheasants, chickens, pigeons and waterfowl, most pronounced aversion manifests itself with respect to foods dyed with colors near the center of the humanly visible spectrum, in the yellow and green sectors. Captive bob-white, however, have shown a marked aversion to grain colored a brilliant red. Grains that have been dyed orange or purple have been accepted without pronounced aversion by English sparrows and bob-white quail in captivity." Mammals, on the other hand pay little attention to color. "Summarizing the possibilities in the use of color in lethal baits for rodents it can be said, even at this early time, that it gives promise of lowering the accidental kill

of seed-eating birds and it may permit the use of certain poisons not now employed because of their hazards to birds. Removal of apprehension regarding the safety of bird life should also make for better relations between farmers, sportsmen and game administrative agencies on the one hand, and those obligated to carry out rodent control on the other. Although it is still too early to foretell the ultimate possibilities the simple physiological fact that birds can perceive color and rodents may not, bids fair to have some practical applications." [Comment: As birds in nature take so many green (foliage and insect) and yellow (seed and grain) foods, it seems possible that some factor or factors other than color were responsible for the aversions noted in these tests.]

Weights: Pheasant

Mohler, Levi L. Pheasant weights and time of season in relation to meat production in Nebraska, Trans. Eighth N. A. Wildlife Conference 1943 (American Wildlife Institute, Investment Bldg., Washington, 5, D. C. $1.00 a copy), pp. 210-211.

Weighing nearly 500 pheasants taken through a split open season extending over a period of 6 weeks revealed a steady gain in average weight. Apparently a later open season would result in a greater poundage of meat at the rate of an ounce per bird in 10 days. Birds of the year composed 71.8 percent of the take in 1942.

NOTES AND NEWS

Those interested in outdoor living will welcome the book "How to survive on land and sea," issued by the Aviation Training Division, Office of the Chief of Naval Operations, U. S. Navy. It is a well made and thoroughly illustrated volume of 264 pages. It was prepared by John Craighead and Frank Craighead, Jr., as the basic text for the United States Naval Aviation survival training program. Chapters treat: general survival hints, water, wild plant and animal foods, survival in special areas, and environmental hazards. The book may be obtained from the Naval Institute, Annapolis, Md., for $2.00 a copy.

After various production delays, "The Journals of John and William Bartram" are available in book form. These pre-revolutionary documents have been published as Vol. 33, Pts. 1-2 (iv+242 pp., 48 pls., quarto, $5.00 a copy) by The American Philosophical Society (Philadelphia, Pa.). Their natural history and other valuable features have been fully brought out by the thorough and skillful annotations of Francis Harper.

A second and enlarged edition of "Conservation in the United States," by A. F. Gustafson, C. H. Guise, W. J. Hamilton, Jr., and H. Ries, is dated 1944 (477 pp., 236 figs., 12 tables, Comstock Publishing Co., Ithaca, N. Y. $4.00 a copy). Hamilton's section on Conservation of Wildlife occupies pp. 291-374. The first edition was abstracted in WILDLIFE REVIEW, No. 19, April 1939, p. 4.

A Wildlife Field Notebook (Wildlife Supply Co., 410 Van Buren St., Saginaw, Mich. 60 cents a copy; 50 cents each in lots of 12) consists of 3x5 slips separable by perforations. Each has a heading on which usually recorded details of observations may be checked or conveniently entered, followed by lines for writing in additional information. These slips, which can be handled in card-catalogue form, seem to provide the basis for that part of the journal and card system that every naturalist could profitably maintain.

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